RAS 9813

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28 February 2005

Attn:. Rulemaking Adjudications Staff of the Secretary
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Office of the General Counsel
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Washington DC 20555-0001

Donald j Silverman esq.
USEC Counsel
Morgan Lewis Bockius
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Washington DC 20004

Dear Sirs and Mesdames,

The attached petition for intervention in the USEC American Centrifuge Plant licensing action was filed today, February 28, electronically (by e-mail) before the 5 pm deadline.

This hard copy contains some changes to the body of the petition and supercedes the electronic version. This copy also includes all the exhibits, whereas only some of the exhibits were available in electronic form.

Hard copies may bear a March 1 postmark for the following reason: Two supporting statements arrived by fax and Fedex too late to be included in a mailing by Monday midnight. These were the statements of Charles Beegle, the owner of a historic property on the boundary of DOE land in Piketon, and of Karen Kaniatobe, Tribal Historic Preservation Officer of the Absentee Shawnee Tribe of Oklahoma.

Both Mr. Beegle and Ms. Kaniatobe have standing to intervene themselves by virtue of their landowner and tribal status. Because of the security problem related to the timing of this case, each of them came to the case very late. While I am not speaking for them, they both decided to support my intervention in lieu of challenging the Commission's ruling limiting intervention to specific parties. For this reason I felt it essential to include their statements, even if causing some hours delay. I am sending these

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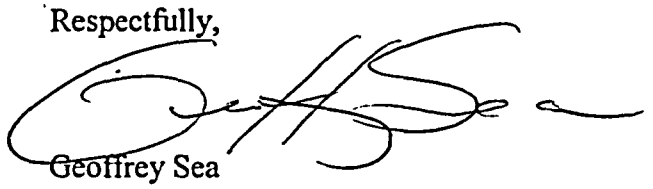
packages by overnight mail, so that they will arrive earlier than they would have had I mailed them first class.

A corrected copy of the electronic text is available upon request.

Thank you for your consideration.

Respectfully,



Geoffrey Sea

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE SECRETARY

In the Matter of	)	Filed February 28, 2005
USEC Inc. (American Centrifuge Plant)	)	Docket No. 70-7004

PETITION TO INTERVENE

BY GEOFFREY SEA

Pursuant to 10 CFR 2.309, the notices published by the Nuclear Regulatory Commission ("NRC" or the "Commission") in the Federal Register on October 18, 2004 (Volume 69, pages 61411-61416), and the Commission ruling of December 29, 2004, Petitioner Geoffrey Sea hereby petitions to intervene in the above-captioned proceeding. As demonstrated below, Petitioner has standing to make this petition.

Description of Proceeding

This proceeding concerns an application by USEC Inc. for licenses necessary to authorize construction and operation of a gas centrifuge enrichment facility on the existing federal "atomic reservation" in Sargents, Ohio, in Scioto Township near the town of Piketon. On October 7, 2004, the Commission issued a Notice of Receipt of Application for License; Notice of Availability of Applicant's Environmental Report; Notice of Consideration of Issuance of License; and Notice of Hearing and Commission Order, all related to USEC's application for a

license. If granted pursuant to 10 CFR 30.33, 40.32, and 70.23, the NRC licenses sought by USEC would authorize USEC to construct and operate perhaps the first full-scale gas centrifuge enrichment facility in the United States, and perhaps the first gas centrifuge facility outside of Russia to enrich uranium to the grade of 10% Uranium-235. The proposed facility would also be unique in that it would be operated by a quasi-private company on federal land, using federally-owned equipment, under the special provisions of the USEC Privatization Act of 1998, a whole body of federal law that applies uniquely to this one company.

Description of Petitioner

Petitioner Geoffrey Sea is an American citizen who lived in the Piketon area intermittently between 1980 and 1982, and as principal residence between 1982 and 1986, during which time he was employed as a staff consultant to the Oil, Chemical and Atomic Workers International Union, Local 3-689, which represented workers at the Piketon enrichment plant. Petitioner is now a writer under contract to write a historical, literary and scientific book about Piketon for Viking-Penguin. Petitioner has published and produced numerous works about Piketon including his senior honors thesis at Harvard College in 1981 and a long essay in the Winter 2004 issue of the *American Scholar* (Exhibit C). Petitioner has been in the process of relocating back to the Piketon area since the summer of 2004, and intends to make his permanent residence in Scioto Township. Petitioner is a member of organizations dedicated to historic preservation and ecological conservation in Ohio, including Heritage Ohio and Audubon Ohio.

Petitioner Geoffrey Sea was one of six parties granted an extension of time to petition to intervene by the Commission's ruling of December 29, 2004.

Standing

As required by NRC's Federal Register notice and 10 CFR 2.309, a petition to intervene must state:

(i) The name, address, and telephone number of the requestor or petitioner;
(ii) The nature of the requestor's/petitioner's right under the Act to be made a party to the proceeding;
(iii) The nature and extent of the requestor's/petitioner's property, financial or other interest in the proceeding; and
(iv) The possible effect of any decision or order that may be issued in the proceeding on the requestor's/petitioner's interest.

Case law of the NRC further explains the standing requirement. The Atomic Safety and Licensing Board recently summarized these standing requirements:

> When determining whether a petitioner has established the necessary "interest" under section 2.714 [now 2.309], licensing boards are directed by Commission precedent to look for guidance to judicial concepts of standing. *See, e.g., Yankee Atomic Electric Company* (Yankee Nuclear Power Station), CLI-98-21, 48 NRC 185, 195 (1998); *Quivira Mining Co.* (Ambrosia Lake Facility, Grants, New Mexico), , CLI-98-11, 48 NRC 1, 5-6 (1998); *Georgia Institute of Technology* (Georgia Tech Research Reactor, Atlanta, Georgia), CLI-95-2, 42 NRC 111, 115 (1995). According to these concepts, to qualify for standing a petitioner must allege (1) a concrete and particularized injury that is (2) fairly traceable to the challenged action and (3) likely to be redressed by a favorable decision. *See, e.g., Steel Co. v. Citizens for a Better Environment,* 523 U.S. 83, 102-04 (1998); *Kelly v. Selin,* 42 F.3d 1501, 1508 (6th Cir. 1995). These three criteria are commonly referred to, respectively, as "injury in fact," causality, and redressability. The requisite injury may be either actual or threatened. *Yankee,* CLI-98-21, 48 NRC at 195 (citing, e.g., *Wilderness Society v. Griles,* 824 F.2d 4, 11 (D.C. Cir. 1987)), but must arguably lie within the "zone of interests" protected by the statutes governing the proceeding—here, either the AEA or the National Environmental Policy Act (NEPA). *See Yankee,* CLI-98-21, 48 NRC at 195-196; *Ambrosia Lake Facility,* CLI-98-11, 48 NRC at 6.

In re *Duke Energy Corp.* (Catawba Nuclear Station, Units 1 and 2), LBP-04-04, __ NRC __ (March 4, 2004) (at 11-12).

Petitioner's standing to participate in this proceeding is demonstrated by his past residence and current property interests in Pike County, and by his past and current occupational interests in the Piketon atomic site—his longstanding commitment to historic preservation in

Scioto Township and to industrial conversion of the Piketon atomic site. These interests will be described in turn.

a. Residence and Property Interests

Petitioner has equitable title under a contract to purchase the Barnes Home and surrounding 87 acres, a historic property that borders on the proposed site of the American Centrifuge Plant and is the closest residence to the proposed project, located at 1832 Wakefield Mound Road. (See map prepared by Petitioner marked as Exhibit A and verification of the accuracy of the map by local landowner Charles Beegle, marked as Exhibit B.)

The Barnes Home itself is between a half mile and a mile from the proposed centrifuge buildings. Petitioner's interest in this property goes back to 1983, when Petitioner began to investigate the shooting of the last passenger pigeon ever seen in the wild (known as the Sargents Pigeon). Petitioner is the first to discover the precise location of the shooting, about a mile south of the Barnes Home. After the shooting in March of 1900, the specimen was carried to the Barnes Home, where it was mounted and displayed between 1900 and 1915. (See Petitioner's essay, "A Pigeon in Piketon," attached as Exhibit C, letter from Bob Glotzhober of the Ohio Historical Society attached as Exhibit D, and Statement of Support from Jerome Tinianow marked as Exhibit E.) In 1915, the specimen was donated by Henry Clay Barnes to the Ohio Historical Society, where it is now on display in Columbus.

The Barnes Home was built on top of and alongside one of the largest ancient earthworks in North America—a series of enormous circles and squares that came to be known as the Barnes Works. (See Exhibit A, and the Statements of Roger Kennedy and John Hancock marked as Exhibits F and H.)

Petitioner first contracted and paid a deposit to purchase the Barnes Home in September of 2004, prior to public notice of USEC's license application. Subsequently, in November, 2004, while petitioner was arranging financing for the purchase, Petitioner filed a "questionnaire" with the Ohio Historic Preservation Office (OHPO), to have the property listed on the National Register of Historic Places. OHPO responded with a preliminary determination that the Barnes Home does qualify for listing, on the basis of its architectural significance, and for its association with the story of the Sargents Pigeon. (See attached letter from OHPO, Exhibit I). Petitioner is now engaged in preparing the nomination paper for listing on the National Register.

The Barnes Home property has already been impacted by the existing and proposed enrichment plants in many ways. Much of the land for the atomic reservation, including the land under or near the proposed centrifuge site, was originally taken from the Barnes estate. (See deed description of Barnes property attached as Exhibit J.) Three powerline easements dating from the 1950s cross the current property. (See easement deed attached as Exhibit K.) The property shares a fence line approximately one mile long with the atomic site, a boundary marked by barbed wire fence and federal "no trespassing" signs. In 2003, the Department of Energy initiated a program of defoliating a ten-foot "security strip" along this fence line, utilizing the herbicide Garlan-4, which is Dow Chemical's successor to Agent Orange. (This information was provided to Petitioner verbally by the Department of Energy following Petitioner's questions on the subject at the semiannual environmental review meeting in Piketon on December 2, 2004). The existing buildings for the American Centrifuge Plant are clearly visible from the back fence line of the property (see photograph from fence line attached as Exhibit L), and the new proposed buildings would be even closer.

Petitioner has already paid a substantial sum (withheld for proprietary reasons) for deposit, extended purchase options and legal fees to arrange the purchase. Some of these costs have been necessitated by the difficulty of obtaining financing for a property so thoroughly threatened by a large nuclear project. The purchase is anticipated to be completed soon, but Petitioner has already been harmed by increased costs and delays. (Copies of the purchase contract and extension agreements are being withheld for proprietary reasons.)

If the license is granted and construction and operation of ACP proceed, the potential for future harm is enormous. The Barnes Home is in the direction of prevailing winds (USEC environmental report, Figures 3.6.1-2 and 3.6.1-3) and in the direction of previous offsite migrations of uranium hexafluoride gas, including the large accidental release that occurred in March, 1978. (See Exhibit C.) Two creeks cross the Barnes Home property, stemming from the direction of the ACP site. While the Department of Energy has acknowledged no contamination in these creeks in the past, there has been speculation in the community about potential contamination. The original well-water line for the Barnes Home was severed by construction of the A-Plant southwest access road, which makes future water supply for the house difficult if that road is opened or widened (it is not now in use). In terms of future radiation exposure, the USEC environmental report, not available for public review until December 29, 2004, includes a projected model for the "Maximally Exposed Individual" member of the public or "MEI." On page 4-78 it states: "The model indicates that the MEI is a hypothetical individual living on the DOE reservation boundary 1.1 km south-southwest of the ACP." Petitioner has met this hypothetical individual. It's him.

The ACP project may have significant adverse impacts on the remains of the Hopewell earthworks, in ways that have not yet been studied. New nuclear production may also have a

significant impact on neighboring property values, and on the likelihood of attracting grants for historic preservation. It also could make Petitioner's property a target for terrorism or for invasive security measures aimed at combating terrorism

Petitioner is a single man who would like someday to raise a family. The Barnes Home once accommodated a family of ten children. That prospect is highly unlikely and of dubious merit if ACP proceeds.

In the 1960s, the Barnes Home was open for weekend public tours and the guest books from those days survive. It was and is the Petitioner's intention to see that the Barnes Home, which was built in 1804-1805, is restored and opened to the public as a museum, a memorial site for the passenger pigeon, an educational center for the Hopewell earthworks, and as a tourist attraction for the county. (See letter from Linda Basye, Executive Director of the Pike County Convention and Visitors Bureau attached as Exhibit M.) All of these plans will be severely impacted by building and operation of the ACP. (See Statement of John E. Hancock, attached as Exhibit H.)

Petitioner has presumptive standing by virtue of his equitable title, proximity to the proposed project, and injuries actual and potential.

b. Occupational Interests

In 1983, Petitioner proposed to his then employer, the Oil, Chemical and Atomic Workers Union, that the union initiate a project to plan for the alternative use of any facility at Piketon that would become surplus—either the gaseous diffusion site or the new centrifuge buildings or both. Subsequently the union did do this under the name Atomic Reclamation and Conversion Project (ARC), hiring the Petitioner as director. In this capacity, Petitioner became a

leading advocate for alternative use planning at Piketon through writing, public speaking and lobbying. (A comprehensive analysis by the Petitioner of alternative use planning at Piketon was published in 1984: "Converting an Industry: Atomic Workers and Communities Organize Against Plant Closures," by Geoffrey Sea, *Plowshare Press*, January-February, 1984.) Petitioner also crafted the package of compensation and retraining provisions that became the basis for closure and environmental restoration at the Fernald, Ohio, uranium plant.

After Petitioner left the union's employment in 1985, Petitioner continued as director of ARC, which became a project of the Tides Foundation. Meanwhile, ARC had three direct spin-offs at Piketon—the Alternative Use Planning project at the Department of Energy, the Waste Heat Utilization Program, and the Southern Ohio Diversification Initiative.

In 2004, Petitioner returned to this topic with publication of his essay in the *American Scholar*. (Exhibit C.) A major theme of the essay, written before Petitioner had heard of the ACP and published one month before USEC announced Piketon as site for the ACP, was that the end of production at the gaseous diffusion plant at Piketon—in 2001—could be a godsend for the community by permitting an opening up of the site, environmental restoration, and conversion of some facilities to alternative use. Petitioner made the specific proposal that the X-326 building, which is highly contaminated and may need to be entombed, could become a major project in public art by making the entombed building into a national monument in recognition of the extinction of the passenger pigeon. This proposal will be elaborated in Petitioner's forthcoming book.

These are serious ideas that have attracted serious interest, including from a former director of the National Park Service. (See Statement of Roger Kennedy, attached as Exhibit F, and the resume of Roger Kennedy attached as Exhibit G.)

First as a labor consultant, later as a writer, historian and preservation activist, and as a member of Heritage Ohio and Audubon Ohio, the Petitioner has acquired a career interest in seeing that historic preservation, environmental restoration, occupational retraining and industrial conversion proceed at the Piketon site unimpeded. ACP would dash all of these hopes and make Piketon into a showcase for the failure of imagination. (See Exhibits F and H).

Interests of the Petitioner coincide with those of other parties who might have chosen to intervene had they had sufficient notice and opportunity to do so. Neither USEC nor the Department of Energy contacted owners of historic properties around the proposed site of ACP (see Exhibit B), nor did they contact Native American tribes with historic ties to the land (see Exhibit N). Between October 25, 2004, and December 29, 2004, all case related documents were removed from public access while NRC conducted a "security review." During this time there was no outreach to inform parties who might be impacted by ACP. When case documents were restored to public access, the day before New Year's Eve, NRC simultaneously issued a ruling limiting intervention to only those parties who had requested an extension of time while the project was still under wraps. Petitioner may be among the very few parties who both has standing and had the wherewithal to request an extension. Therefore, while Petitioner does not and cannot represent other parties in the intervention, interested parties who otherwise would have standing by virtue of tribal or landowner status clearly look to Petitioner's intervention as an expression of their thwarted interests. (See Statements of Karen Kaniatobe and Charles Beegle, Exhibits N and B.)

In the brief period that has elapsed since information about the ACP has been accessible to the public, Petitioner's intervention has also drawn substantial support from experts and leaders in conservation and historic preservation. Enthusiastic statements of support have been

provided not only by a Tribal Historic Preservation Officer and one of the most prominent landowners in Scioto Township, but also by the executive director of Audubon Ohio (Exhibit E), a former director of both the National Park Service and the National Museum of American History (Exhibit F), the director of the leading project for virtual reconstruction of the ancient Ohio Valley (Exhibit H) and the nation's leading expert on federal agency preservation (Exhibit Q). These authorities are of diverse backgrounds and opinions, but they share a common view that this case will represent a watershed in either the application or the demolition of federal preservation law.

For the protection of his vital interests, Petitioner seeks to ensure that the American Centrifuge Plant is not licensed to be built or to operate at the proposed site in Scioto Township.

Specific Aspects of the Subject Matter as to which Petitioners Seek to Intervene

As contemplated by the Federal Register notice, Petitioner sets forth below the specific aspects of the subject matter of this proceeding as to which he wishes to intervene:

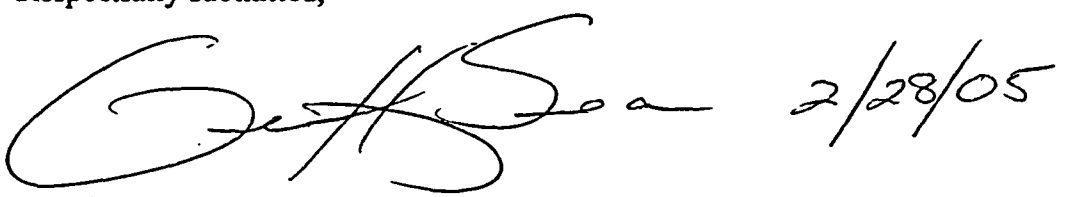
1. Whether the applicant has adequately assessed cultural resources in the area impacted by the proposed projects, or the potential impacts that might occur.
2. Whether provisions of the National Historic Preservation Act and related legislation have been met for the various components of federal involvement in the project.
3. Whether USEC's lease arrangement with the Department of Energy might be illegal or invalid due to DOE's failure to comply with the National Historic Preservation Act.

4. Whether the applicant has properly considered and assessed alternatives to the proposed action.
5. Whether the applicant has considered the diverse impacts of the project on surrounding areas in terms of environmental pollution, traffic congestion and road construction, reduced land values, impeded county development plans, and national-security restricted use including keeping the entire DOE reservation under national security restriction as opposed to opening the site or parts of the site to alternative use.
6. Whether the applicant has properly planned for and acknowledged the possibility of project failure at any point—including plans for the payment of cleanup and decommissioning costs.
7. Whether the applicant has accounted for the impact of the proposed project on the Department of Energy's plans and budgets for site cleanup, environmental restoration, and eventual community reuse.
8. Whether sufficient information has been provided concerning the risks to national security based on probable proliferation of nuclear weapons technology that may result from the construction of the proposed facility.
9. Whether sufficient information has been provided about the need, or lack of need, for the proposed facility in the market for uranium enrichment services, and about USEC's capacity to carry the project through to completion.
10. Lack of clarity and conflicts of interest in the public-private relationship between USEC and the federal government and in the nebulous quasi-private status and organization of USEC.

Conclusion

For the foregoing reasons, Petitioner has demonstrated his standing to intervene in the pending proceeding and to participate in the forthcoming hearing on the issuance of licenses to USEC to construct and operate the proposed facility. Petitioner should be admitted as an intervener.

Respectfully submitted,



2/28/05

Geoffrey Sea

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE SECRETARY

In the Matter of	)	Filed February 28, 2005
USEC Inc. (American Centrifuge Plant)	)	Docket No. 70-7004

CONTENTIONS ON THE CONSTRUCTION PERMIT/OPERATING LICENSE APPLICATION FOR THE AMERICAN CENTRIFUGE PLANT MADE BY GEOFFREY SEA

Pursuant to 10 CFR 2.309, the notices published by the Nuclear Regulatory Commission ("NRC" or the "Commission") at 69 Fed. Reg. 61411-61416 (Oct. 18, 2004), and the Commission ruling of December 29, 2004, Petitioner Geoffrey Sea presents the following contentions for hearing on the construction permit/operating license application by USEC Inc. Each of the contentions asserted herein is within the scope of this licensing proceeding and concerns matters that are material to the determinations to be made in such proceeding, as required by 10 CFR 2.309(f).

Contentions presented herein are organized into the following categories:

1. Assessment of cultural resources

2. Compliance with federal historic preservation laws.

3. Consideration of action alternatives.

4. Impacts on surrounding area.

5. Impacts on site cleanup and community reuse.

6. Nuclear proliferation considerations.

7. Structure and viability of USEC and of the USEC-DOE relationship.

1. Assessment of Cultural Resources

1.1 Contention: USEC has failed to identify cultural resources potentially impacted by the American Centrifuge Plant.

Basis: In the executive summary of USEC's environmental report, USEC summarizes its search for impacted resources this way (page 4): "There are no wetlands, critical habitat, cultural, historical or visual resources that will be adversely affected by the refurbishment, construction or operation of the ACP at the DOE reservation in Piketon, Ohio."

This statement is somewhat akin to Baghdad Bob claiming to have routed American infidel invaders even as US forces bear down upon him.

Nowhere in USEC's environmental report do the words "National Register of Historic Places" appear, and it is apparent by their absence that either no one at USEC or the Department of Energy checked to see if any National Register sites were nearby, or after checking no one wanted to admit of the findings. Had they done so, they would have discovered and reported that the only two prehistoric National Register sites in Pike County are in immediate proximity to the proposed ACP, and that these two sites, which once were connected, constitute one of the largest, most important and most beautiful examples of prehistoric architecture in the world. (See Exhibits A, B, F, H and N). These works are also considered sacred sites to Native American descendants of the Ohio

Hopewell Indians who constructed them. (See the Statement of Karen Kaniatobe, Tribal Historic Preservation Officer of the Absentee Shawnee Tribe, marked as Exhibit N.)

In 1820, Caleb Atwater surveyed "parallel walls of earth" near the Scioto River, and included a drawing of them in his treatise called *Description of the Antiquities Discovered in the State of Ohio and other Western States* (Plate XI). Atwater's plate was confusing because there are actually many ancient parallel walls of earth in this area, all of which mark segments of what we now call the Great Hopewell Road. The most prominent segment has been dubbed the Piketon Works and is located just north of the atomic site—it is listed on the National Register (site 74001599). Old-time settlers along the Scioto River south of Piketon also had their parallel walls, on land owned by the Rittenour family. The Rittenours interpreted Atwater's Plate XI as referring to these segmented walls along the river, which is why Charles Beegle, who married Jean Rittenour, remembers his father-in-law talking about "Indian foot races" there—a somewhat bizarre notion that derives directly from Atwater's treatise. (For Atwater, these ruins resembled the classical ruins of an Olympic stadium. See the Statement of Charles Beegle, Exhibit B.) All of the ancient earthen walls in this area should be considered as part of the Piketon Works. (See Roger G. Kennedy, *Hidden Cities: The Discovery and Loss of Ancient American Civilization*, Penguin, 1994.)

In 1982, the Department of Energy seized a part of this riverfront land from the Rittenour-Beegle estate, including the segmented earthen walls along the river, apparently oblivious to them. DOE (and AEC before it) has used these artificial embankments to shield their wells from flood waters—wells that supply the main atomic

site with its water. (See Exhibit B.) The effects of the pumping of water out from under these earthworks has never been studied (See Exhibits B and N).

In 1846, Isaac Newton Barnes invited the famous archaeologists Ephraim Squier and Edwin Davis onto his land, to survey the astounding Hopewell circle and square—each covering some twenty acres—that he could see from his bedroom window, about a mile south of the Piketon Works. Squier and Davis dubbed these the Seal Township Works, and featured them prominently in their 1848 masterpiece, *Ancient Monuments of the Mississippi Valley* (Plate XXIV). The plate, which is attached as Exhibit O, contains certain inaccuracies that should be noted. The square was larger and the circle smaller, so that they actually covered an approximately equal area. The connecting passage angled differently. And many features, both large and small, were missed due to overgrowth and absence of aerial perspective.

Snowden Sargent, who came from Sargents, Ohio, and whose two sisters married two Barnes brothers, had moved to Illinois where he became a major early backer of Abraham Lincoln's political ambitions. (Personal communication with staff at the Lincoln library.) When *Ancient Monuments* was published, Snowden Sargent probably showed a copy to Lincoln, because Lincoln made a serious detour in December 1848 on his way from Illinois to serve out his term in Congress, just so he could stay with Snowden's sister at the Barnes Home and view the famous circle and square. He was recorded as late arriving to Congress. (See letter from Linda Basye of the Pike County Convention and Visitors Bureau, Exhibit M, for verification of the Lincoln visit. It should be noted that Ms. Basye followed local legend in asserting that the Lincoln visit happened in 1859. More recent research confirms that it happened in 1848.)

These earthworks were surveyed again in the 1880s, and included in the 1889 Smithsonian study by Cyrus Thomas called *The Circular, Square, and Octagonal Earthworks of*

Ohio. They were featured also in Gerard Fowke's *Archaeological History of Ohio* of 1902—Fowke called them the Barnes Works. More recently, William Morgan's *Prehistoric Architecture in the Eastern United States* of 1980 discussed the works as an exemplar of ancient geometric landscape art, and the eminent historian Roger Kennedy discusses the Barnes Works as a possible southern terminus or nexus of the Great Hopewell Road in *Hidden Cities: The Discovery and Loss of Ancient American Civilization.*

Called either the Barnes Works or the Scioto Township Works (since Scioto broke away from Seal), the small circle was largely destroyed by the modernization of Route 23 to accommodate increased traffic for the enrichment plant in 1952. The square and many of the smaller structures were partially destroyed around that same time by a gravel quarry, which included an asphalt plant that produced pavement for the atomic site. The Scioto Township Works are also now listed on the National Register (site 74001600), though little remains of what was apparent in the 19th century.

Because of this destruction wrought by the A-Plant and associated highways and gravel quarries, people forgot about these earthworks. No recent survey has been conducted. This is truly unfortunate because the nineteenth century surveyors lacked an essential tool for assessing the extent of the works—aerial photography. Today, if one examines an aerial photograph of the area from 1951—the year before the A-plant was built—one can see the circle and square quite clearly, but also something else, a much larger circle whose edge passed precisely between the smaller circle and the square. This larger circle, which has also not been professionally surveyed, passes right by the A-plant's southwest access road and right through the area that USEC might want to pave over to connect that road to Route 23. This large circular enclosure is

more than twice the size of the largest Hopewell enclosure previously known, at Chillicothe. (See Exhibit H.)

To give a sense of the relation of the earthworks to the proposed American Centrifuge Plant, Petitioner has constructed a map, Exhibit A, that is admittedly anachronistic. It depicts the full extent of the earthworks as they existed prior to modern destruction, compiled on the basis of nineteenth century surveys as can be corrected by twentieth century aerial photographs. Alongside these ancient works Petitioner has located the main A-Plant buildings as USEC would like to build them in the future. The map makes clear what a galactic oversight it has been for USEC and DOE to ignore some of the most striking and important cultural resources one could ever imagine. It's a bit like standing next to the Taj Mahal while claiming not to notice anything white.

A few things immediately become clear upon perusal of this map. Both the Hopewell mound-builders and the monument builders of the Atomic Energy Commission oriented their rectangular structures to the cardinal directions. For the Hopewell this was essential to the sacred purpose of tracking the movements of the sun and moon, and these works have been determined to exhibit sophisticated archaeoastronomical alignments (See Exhibit H.). The atomic engineers, by contrast, were more primitive and only used the compass bearings to keep otherwise crooked lines straight. And though the AEC often boasted of building the largest structure in the world in terms of ground cover at Piketon, the adjacent ancient earthwork enclosure, much of which still stands, actually extends over more acreage. The latter has lasted about two thousand years; the former only fifty. Which structure is most likely to endure a hundred or a thousand years from now?

Not unlike the designers who envisioned a giant centrifuge plant of many small spinning circles within large cubic buildings, Hopewell engineers were engaged in an elaborate meditation on the forms of circle and square two thousand years ago—a small circle encompassed a tangent square, and the juxtaposed circle and square may have been of equal area (impossible to tell with precision since the circle was destroyed). Ratios also suggest mathematical sophistication—the main square had a side exactly one quarter the diameter of the large enclosure circle that contained it. (Put another way, the perimeter of the square was equal to the diameter of the large circle.) That these mathematicians were non-literate adds substantially to the wonder of these works. Hopewell Ohio emerges as the full and long-sought North American equivalent of ancient Mesoamerica and Peru. What secrets have they yet to reveal?

The great philosophers of the nineteenth century (apparently unread by USEC) realized as much. In 1841, Ralph Waldo Emerson wrote:

> "All inquiry into antiquity—all curiosity respecting the Pyramids, the excavated cities, Stonehenge, the Ohio Circles, Mexico, Memphis—is the desire to do away this wild, savage, and preposterous There and Then, and introduce in its place the Here and Now." (*Essays, First Series*, "History.")

Mapping the Piketon Works and the Barnes Works together clarifies the former's purpose. Undoubtedly, the roadway once connected to the ceremonial center just south of it—the rare straight section of the river has worked to preserve this one segment alone. Probably, this once extended northward all the way along the river to Chillicothe, and then on to Newark, where surviving road remnants have been dubbed "The Great Hopewell Road." The Piketon Works may be the last vestige of the whole middle part of the pathway, which likely continued southward to Portsmouth, where substantial road segments also once were found (but have been

destroyed). (See Kennedy, *Hidden Cities: The Discovery and Loss of Ancient North American Civilization.*)

The most astounding lesson of this map is just how close and interrelated the Hopewell Works and the A-Plant really are. How could these earthworks have been forgotten? Or have they been?

When the central portion of the A-Plant site was leveled by bulldozers in 1952, at least one ancient burial mound was encountered and destroyed. Other indigenous remains and artifacts found on the site since then have always been identified as Adena, as if to suggest that they are part of isolated and insignificant ancient burials. (The Adena did not build large ceremonial and cosmopolitan centers as did the Hopewell.) When asked to produce evidence that the artifacts found onsite are Adena, DOE cannot. (Nor does there appear to be a record of the 1952 excavations, except in local newspapers.)

In fact DOE has kept secret two archaeological surveys conducted in 1996 and referenced vaguely in the USEC environmental report for the ACP in section 3.8.1. Apparently thse surveys focused only on the land that is within the perimeter road—that is, land already massively disturbed by GDP construction in 1952. Petitioner has tried to obtain a copy of these survey reports or even determine when they would be released: no dice. It appears that they are perpetual "working drafts." DOE officials have suggested that the reports cannot be released because they might contain unreliable or unanalyzed information. And yet they provided a copies of the reports or data from them to USEC, which uses vague references to the data as support for its contention that no important cultural resources survive on the site. This is a flim-flam game. DOE claims the reports as drafts, unready for release, yet USEC cites the reports'

authority to justify a license. (Obviously, the reports must now be released so that the public can evaluate their contents.)

It's pretty clear what's really going on here. The "secret" contained in those reports, or in the omissions, is that most artifacts on the A-Plant site are Hopewell, not Adena. Look at the map again. The Hopewell did not build isolated ceremonial sites. The giant earthworks were the public spaces at the centers of large residential and occupational complexes. The Barnes Works includes the largest Hopewell enclosure found to date. That means that Piketon may have been the largest cosmopolis in North America, two thousand years ago. (Paul Pacheco has given a generalized model for Hopewell settlement patterns, depicted in Exhibit P.)

Earth-moving activity at the A-Plant site very likely has run into all manner of archaeological treasure, in 1952 and since. But atomic secrecy has served as the perfect cover for sweeping it all under the rug and into that great dust heap called History. Who knows what we have not been told, and why has federal preservation law never been applied at Piketon?

In the recent Risk-Based End-State document for the Piketon site, the Department of Energy included a map (Figure 3.1a) that showed known "archaeological/historical sites" on the atomic reservation. But the map did not include the known Indian mounds that were destroyed during plant construction in 1952, nor did it include any of the famous Hopewell earthworks that are just offsite, even though they are listed on the National Register and even though they are close enough to appear on the map. Nor did it include DOE's riverfront property, separated from the main site, where a section of the Piketon Works are located. Nor did it include any of the historical homes. These obvious and illegal omissions have allowed DOE to avoid its obligation of conducting thorough cultural resource impact assessments, to match its elaborate environmental impact assessments. And USEC has inherited that DOE record of negligence.

The ancient earthworks are not the only threatened cultural resources. The three core families who founded the town of Sargents—the Sargents, the Barnes and the Rittenours—all built astounding homes inspired by Hopewell geometrics in the first decades of the nineteenth century, and all three homes still stand, each made from the same local red clay brick that attracted the Hopewell to this same locale. These families all married into each other, to the point where they became one big clan. (See Exhibit B.) The Barnes Home is now in the process of nomination for the National Register. Charles Beegle wishes to also see the Rittenour Home in nomination (Exhibit B). The Sargent Home is in the worst condition, plagued by its location at the main entrance of the atomic reservation, but it too has qualities that would qualify it for the National Register.

Wakefield Mound Road, which unites these three homes, once was called the Scioto Trail and before that it was The Warriors Path—the main thoroughfare for annual Shawnee migrations. During the period of Shawnee occupation, this region was dense with Shawnee settlements (see Exhibit N), the sites of which have gone undiscovered only because no one has looked for them. And two thousand years ago, before it was The Warriors Path, this was the Great Hopewell Road (we obviously don't know the indigenous name).

You don't have to look very hard to find important cultural resources in this area. Of course, there are none so blind as those who will not see.

Contention 1.2 USEC has failed to identify potential impacts of the American Centrifuge Plant on nearby historic and prehistoric sites.

Basis: Since USEC failed to identify any significant nearby cultural resources, its failure to identify potential adverse impacts on those resources follows logically (if illogically).

Among the potential adverse impacts of the ACP on cultural resources, none mentioned by USEC, are the following:

1. Potential direct damage to the Scioto River earthworks caused by renewed water pumping once ACP is in operation. (See Exhibits B and N.)
2. Continuation of the DOE policy of using herbicides to defoliate a "security strip" around the atomic site perimeter.
3. Maintenance of the "national security" regime, with its profusion of barbed wire fences, security gates, and closed access to rare cultural treasures.
4. The discouragement of tourism and academic study caused by real and perceived nuclear dangers. (See Exhibit H).
5. Additional degradation, contamination and obliteration of priceless archaeological sites caused by additional road-building, traffic congestion, waste storage and plant emissions.

All of these impacts and more deserve serious study and consideration.

2. Compliance with federal historic preservation laws.

Contention 2.1: The USEC-DOE collaborative arrangement is out of compliance with the National Historic Protection Act and related legislation.

Basis: Section 106 of the National Historic Preservation Act establishes a process for preventing and/or rectifying any federal action that adversely impacts a historical or archaeological resource. Specifically, it mandates a procedure intended to be equivalent to that established by the National Environmental Policy Act for protecting environmental resources. As with NEPA,

the NHPA process essentially involves four stages of assessment, mitigation, negotiation and remediation. Section 106 kicks in when any federal action is contemplated that "may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register [of Historic Places] in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association." (Section 800.5(a)(1))

Similarly, Section 110 of NHPA provides for ongoing federal preservation efforts, or "stewardship," for historic or prehistoric sites that extend onto federal land.

It is important to recognize that the impacted site must not necessarily be listed already on the Register—it must only have qualities that would qualify it for listing. In practice this often means limitation to properties that either are listed or are in the process of consideration for listing. More stringent criteria apply for sites that have or are being considered for status as National Landmarks, which are basically National Register sites that are recognized as having national significance.

It is also important to recognize that the impacted site does not have to be on federal property to be impacted. Section 106 mandates that "areas of potential effects" be established in the assessment phase, which are in every way comparable to environmental impact zones. Areas of potential effects under NHPA—which may include zones of physical damage, of visual or noise impairment, of impact on public access or aesthetic appreciation—often tend to be larger than equivalent zones of environmental impact. (For comprehensive discussion of Section 106 requirements, see Thomas F. King, *Federal Planning and Historic Places: The 106 Process.*)

Compliance with NHPA has been shoddy at best, especially for Department of Energy sites that generally predate the Act, with established operational modes that are hard to change.

But this does not excuse the noncompliance. Petitioner's inquiries to DOE and to the Ohio State Preservation Office as to why its noncompliance has been so conspicuous resulted in the explanation that DOE considers early Manhattan Project sites to be the main cultural resources worthy of protection on its land. This is confirmed by the section of USEC's environmental report titled "Architectural Historic Resources" (Section 3.8.2). There USEC says that the historic clock starts in 1900 and that no historic structures within the studied period of 1900-1985 have yet been identified. That's kinda funny, excluding the obvious historic properties built from 1800 -1900 even from the scope of analysis.

On page 3-64 of the environmental report, USEC says that "there are no scenic rivers in the area." That's pretty funny, too. Has anyone from USEC taken a walk down to the Scioto riverbank, just west of the ACP site, to the place that the Hopewell chose for its magical cosmic beauty? A photo of the view at that location is included as Exhibit S.

There is no evidence that either DOE or USEC has taken obligations under NHPA seriously. Both the Piketon Works and the Barnes Works were added to the National Register of Historic Places in 1974. That should have triggered automatic reviews under the National Historic Preservation Act, which had been initially passed in 1966 and was strengthened through amendments numerous times. It didn't happen.

On page 1-14 of USEC environmental report, USEC states, without elaboration: "Informal consultations have been made with the responsible agencies in compliance with....the National Historic Preservation Act (NHPA), Section 106." USEC further states on page 1-30 that this responsibility consists entirely of consultation with the State Historic Preservation Office—a total misreading of the act. USEC accomplished a pro forma attempt to check off a box on its milestone chart. (Appendix B allegedly containing copies of the compliance letter with the Ohio

Historic Preservation Office has been omitted in toto from the publicly available version of the environmental report.) But NHPA requires much more than that (and section 110 applies in addition to 106 since prehistoric sites extend onto agency land).

An absolute requirement of section 106 is that the agency contact any Native American tribe with historic connections to the locale for consultation. The Absentee Shawnee Tribe of Oklahoma—the tribe with the most clear historical connection to the land of Scioto Township (the Shawnee were driven out of Ohio in the War of 1812)—has received publicity notices for DOE groundbreaking ceremonies at Piketon, showing that DOE knows the tribe exists. But the tribe has never been asked to consult on a 106 or 110 review at Piketon, and neither DOE nor USEC contacted the tribe about the ACP. (Exhibit N.) Likewise, Charles Beegle, the owner of one of the most important historic homes and of land that borders on DOE property, was never, since 1966, contacted for his participation in a 106 or 110 review, and was never contacted by either DOE or USEC about the ACP. (Exhibit B). These two cases exhibit the general pattern.

In public forums, DOE defends its sensitivity to archaeological resources onsite by saying that it tries to avoid physical destruction of such sites, or where it cannot avoid this, by paying for professional excavation. This is a wholly inadequate approach to Section 106 obligations. Physical destruction covers only a small subset of adverse potential effects. Perhaps the largest adverse potential effect at Piketon is the whole umbrella of national security restriction. If the site is cleaned up and developed for diverse non-nuclear and non-military uses, the archaeological sites on and off-site might one day be united, restored, and opened to the public as a showcase of Hopewell earthwork magnificence, like at Chillicothe or Newark. (See Exhibits F and H.) Such a scenario would be consistent with a civilian manufacturing company

leasing the GCEP buildings. It is inconsistent with a new centrifuge facility that would maintain a lock-down status for the entire area.

Exhibit Q is the Statement of Thomas F. King, the foremost expert in federal preservation law and author of four books about the National Historic Preservation Act. Dr. King has carefully reviewed the record in this case and has concluded that there are serious compliance issues meriting this intervention and a full review of the matter by NRC. Dr. King's resume is attached as Exhibit R.

Contention 2.2: Noncompliance with federal preservation law has undermined the legitimacy and legal basis of the USEC-DOE agreement

Basis: It is not the intention of the Petitioner to suggest that NRC is responsible for forcing DOE's compliance with the law. Petitioner recognizes that DOE and NRC are two separate federal agencies. However, in this unusual case, DOE's compliance status has bearing on the viability of USEC's lease agreement with DOE, just as if DOE had failed to comply with NEPA in laying the groundwork for the ACP project. Ultimately, DOE's compliance status and the complexities of the relationships between DOE, USEC and NRC will likely be determined by the Advisory Council on Historic Preservation. But as that process unfolds, NRC has a responsibility to determine if the license applicant has a legal basis for proceeding to build and operate. DOE's noncompliance may have undermined that legal basis. This is a consideration that NRC must give in its licensing deliberations. In other words, if the project is likely to fail in the end because cultural resource issues have not been handled properly, NRC should anticipate that outcome and either deny a license or send the applicant back into the process of negotiating its lease agreement with DOE—this time on a legal basis.

It should be pointed out that the obligations of NHPA do apply to both DOE and NRC. In public statements, DOE officials have maintained that they are legally bound to lease facilities to USEC by the legislation that mandated enrichment privatization. However, that legislation did not exempt DOE from the requirements of NHPA, any more than it did from the requirements of NEPA. NRC must therefore consider in its licensing review that DOE made certain fatal errors in turning over the facilities for USEC use, without proper legal compliance, just as if DOE had failed to comply with NEPA. DOE has also suggested in private conversations with Petitioner that it intends to roll over its 106 responsibility for ACP to NRC, an action that would constitute a clear violation of the law. In other words, NRC must not only conduct its own Section 106 review process, but must also consider that in failing to conduct its 106 review properly, DOE may have undermined the legal basis of its lease to USEC.

3. Consideration of Action Alternatives.

Contention 3.1 USEC has failed to consider a broad range of alternatives to the proposed action.

Basis: USEC, in its environmental report, considers only alternatives for USEC, not for the Piketon site or the community or the American public. Thus, USEC's "alternatives" consist only of "no action," moving ACP to another part of the Piketon site, and moving ACP to Paducah, Kentucky. This is a wholly inadequate approach to the whole question of alternatives. Especially when the applicant proposes to build and operate on public land, it's not the applicant's alternatives that are at issue, but the public's alternatives.

This case is perhaps unique among NRC license applications because a private company is applying for a license to operate a quasi-private venture in existing buildings on a federal site.

The process for considering "reasonable alternatives" under both NEPA and NHPA must therefore be suitably tailored to the specialness of the situation. Since the buildings already exist and are publicly owned, reasonable alternatives for those buildings include the full range of private leasing possibilities as well as other governmental uses. SODI, the Southern Ohio Diversification Initiative, was established and has been been sustained with grants from DOE and USEC to explore possibilities for expanding employment opportunities in the area of the site. However, once SODI actually located a private truck manufacturing company that expressed a desire to lease one of those buildings for a plant that would employ about 800 people, that option was rejected by DOE because of its special legislated commitment to USEC. But as part of NRC's environmental and cultural resource review process, that option must be revived and explored as a reasonable alternative use.

One pernicious aspect of the ACP proposal is that it is a relatively small operation that will nonetheless commandeer the entire site, primarily because of the security regime that must accompany it. In practice, DOE has prohibited discussion of community use of any part of the main site, so that an unbroken "security zone" can be maintained for USEC's ACP. Therefore, the "reasonable alternatives" scenario must encompass not just a single other use for those centrifuge buildings, but a multiplicity of other uses for various parts of the very large site.

For example, what will happen to the old process buildings of the gaseous diffusion site? If the American Centrifuge Plant is built, the northern half of the site—the old diffusion plant—will wind up being cordoned off and left to decay, an enormous eyesore and environmental atrocity. That is clearly the intent of DOE and USEC, since they have built a new administrative office building on the south side of the site, intended to replace the old office building that will be fenced off with the diffusion plant, and perhaps demolished or entombed.

Another scenario is possible. In Petitioner's essay, "A Pigeon in Piketon," (Exhibit C), Petitioner suggests that the old X-326 building, the upper bomb-grade end of the Cascade which is forever contaminated, could be entombed as a national monument—a pyramid—as a memorial to the passenger pigeon, which went extinct on this land. Such a monument, with an environmental education center in a clean building, could become a major draw for tourists and students—entirely consistent with a manufacturing company leasing the GCEP buildings. Under that scenario, much of the surrounding forested land could be turned over to the National Park Service or US Forest Service, which could run nature walks through some of the wilder areas and could create a companion site to its Hopewell park in Chillicothe. A pyramid to the passenger pigeon would complement the Hopewell park—examples of monumental mound architecture, ancient and modern. (See Exhibit F for former NPS Director Roger Kennedy's support of the concept that part of the site can be transferred to management by either the National Park Service, the US Forest Service, or the Ohio State Park system.)

We wouldn't have to stop there. Since the site will be a location of ongoing environmental cleanup, employing cutting edge cleanup technologies, why not move that part of Oak Ridge National Laboratory that does research on environmental cleanup to Piketon? Piketon suffered under control from Oak Ridge for decades. Why can't Piketon benefit from new federal spending on research and development? It's already federal land, of immense historical and archaeological value. Why waste that? A multiplicity of new public and private uses all with an environmental theme must be considered as a "reasonable alternative" to the construction of one iffy and dirty centrifuge plant.

When NRC considers the panoply of potential "reasonable alternatives," it must also consider that once the centrifuge facility is equipped and operated, that space will be irrevocably

tainted, even if the project soon fails. That already happened once in those buildings. When construction of the Gas Centrifuge Enrichment Plant was underway in the 1980s and additional federal funding looked doubtful, local managers ran a "test run" of uranium through the new centrifuges—just for the purpose of contaminating that equipment and those buildings, so to frustrate all the talk of finding some alternative use. If they had not been permitted to do that, those buildings might have been occupied by a manufacturing company for the last fifteen years.

Contention 3.2: USEC's stated action alternatives should be seriously evaluated.

Basis: In its environmental report, USEC suggests the alternative of moving ACP only to shoot it down. By holding out the false hope that ACP might yet be relocated to Kentucky, USEC buys the continued loyalty of its Paducah workforce, while pressuring Ohio politicians into offering up yet more fealty and loot. In table 2.4-1, USEC compares impacts for the Piketon and Paducah alternatives and concludes—big surprise—that for either site, there will be "no significant impact" in terms of historic and cultural resources, visual and scenic resources, socioeconomic factors, environmental justice, public and occupational health, and waste management. On page 2-10 of its environmental report, USEC concludes that Piketon gains advantage only because "siting the ACP at Portsmouth [Piketon] rather than Paducah, resulted in superior financial conditions, significant qualitative advantages, and slightly better regulatory and environmental conditions." In other words, USEC gains proprietary financial and competitive advantage at the expense of treasured public resources.

USEC treats the cultural resource impacts at Piketon and Paducah as if they would be the same. However, we now know that impacts would not be the same. The southwest corner of the Piketon site is precisely the most sensitive in terms of multiple impacts to precious and sacred

cultural resources. USEC should therefore be taken at its word and be instructed to move ACP to Paducah. (See statement of Karen Kaniatobe, Exhibit N). The timeless qualities of the Piketon site take precedence over USEC's timing schedule.

4. Impacts on surrounding area.

Contention 4.1: USEC neglects many potential impacts of ACP on the local community

Basis: Some potential local impacts are obvious but some are less so. When security tightened at the plant-site after 9/11, the perimeter road was closed to local traffic. This is a tremendous inconvenience to residents on the east side of the plant, whose access to town and the highways was blockaded. In 2003 and 2004, the herbicide Garlan-4 was used to defoliate a ten-foot strip around the entire outer boundary of the site, destroying the lush natural vegetation and spreading a kill-zone onto adjoining properties. This was done either out of caprice or out of some new sense of enforcing "perimeter security."

Cleanup and alternative use development can slowly restore the area to some semblance of its great natural beauty and natural development pattern as existed prior to 1952. But construction of the ACP means continued atomic dependency and control, and an artificial economy for the region, continuing on into the indefinite future, perhaps irrevocably even if the project fails.

At the very least, given the many uncertainties of this project, NRC must consider what project failure as well as operation will mean for all the small hamlets and towns in Pike County and beyond. Many in the Pike County area support ACP, often out of a sense of hopelessness that no other major industry can be attracted to the area. Many feel that the gaseous diffusion

plant has already done so much environmental and cultural damage, there is not enough indigenous value left to salvage.

Pierce the surface, however, create some hope in some alternative future beyond nuclear production for Pike County, and one finds deep resentment and anger at the legacy of atomic dependency. This is the feeling expressed by Charles Beegle when he writes: "The only thing that it did was ruin a once beautiful farming valley...From my perspective the plant has been a detriment and enlarging it will continue that degradation. In the process, it will destroy more Hopewell Indian relics and more of the early history of Ohio will be lost." (Exhibit B.)

In private communication, Mr. Beegle told the Petitioner that he brought gravel quarries onto his historic estate for only one reason—he did not want his children to stay in Ohio and raise their families across from the enrichment plant. USEC should be compelled to interview Mr. Beegle and quantify that impact.

5. Impacts on site cleanup and community reuse.

Contention 5.1 USEC fails to consider that ACP has resulted and will result in the relaxation of DOE cleanup standards at the site and reduced possibilities for community reuse of facilities.
Basis: There is a sense in Piketon that DOE supports the USEC vision not just because it was congressionally mandated, but because new nuclear development will relieve DOE of its cleanup obligation and forestall the necessity of restoring parts of the site to safe industrial or agricultural standards. In fact, DOE has already proposed that certain cleanup standards be relaxed because of ACP's predominance on the site. This local concern must be taken seriously, and NRC must

explore the cleanup and restoration pathways under both license award and license denial scenarios.

6. Nuclear proliferation considerations

Contention 6.1: USEC has not accounted for the proliferation risks associated with centrifuge technology.

Basis: It certainly is an odd time to be pursuing an "American Centrifuge" project. USEC's announcement of the "award" of the plant to Piketon had to be postponed twice—first in October of 2003, when Iran preemptively announced that it had an Iranian Centrifuge, and then again in December of 2003, when Libya announced that it had a Libyan Centrifuge. Finally, out of possible fear of being preempted yet again by a Bolivian Centrifuge, USEC chose the day of the Iowa presidential caucuses to announce to a near-empty press gallery that America had its centrifuge, too.

USEC had apparently failed to get a briefing paper to the president, because when the Iranian Centrifuge program was made public, George Bush went on TV to say that such a program is "criminal." USEC might come forth and say that its centrifuge is peaceful and all that. But of course that is just what the Iranians say, as well.

It is obvious that when "The American Centrifuge" is announced as a fait accompli to the world, there will be a backlash. We will be accused of being hypocrites, because we are. Countries on the edge of reconsidering their compliance with the fraying Nonproliferation Treaty will teeter over the edge. That's what this project buys.

From a self-interested perspective in Ohio, we must consider this. What happens if this project travels down the road for a few years or more years and then the North Koreans or the Iranians or the Belarussians say that they will surrender their centrifuge plants, but only if the United States does likewise? Has USEC considered and planned for that scenario? Will the country go to war to save USEC's American Centrifuge Plant? Should it?

Due to such considerations, reputable international policy experts have already started calling for an international ban on centrifuge technology. The Stockholm International Peace Research Institute warns that all centrifuge technology worldwide must be halted in order to avert uncontrolled proliferation:

> "Unfortunately, the centrifuge cat is already partially out of the bag, and a number of operating facilities already exist. Preferably, these facilities should be shut down and dismantled....If it should prove impractical or impossible to shut down the centrifuge plants, then the internationalized centrifuge facilities should be managed in such a way as to prevent the further dissemination of this process....Eventually, the objective should be to phase out the gas centrifuge technique for uranium enrichment." (*Uranium Enrichment and Nuclear Weapon Proliferation,* Alan Krass, Peter Boskma, Boelie Elzen, Wim A. Smit, Stockholm International Peace Research Institute, International Publications Service, Taylor & Francis, Inc. New York, 1983).

And that idea is bolstered by the fact that new demand for nuclear fuel, at least in the United States, can be met by boosting the downblending of old weapons-grade uranium, rather than by enriching more from scratch. And yet noplace in the USEC environmental report is the concept of nuclear proliferation even mentioned.

7. Structure and viability of USEC and of the USEC-DOE relationship.

Contention 7.1: USEC has not clarified the company's stability or long-term prospects, or how its relationship with the Department of Energy is intended to function, or how that relationship might evolve over time.

Basis: USEC is an odd thing. It was created, not for the purpose of enriching uranium, but for the purpose of closing the old diffusion plants down, without liability attaching to any politician. It is theoretically a private entity, but it exists only at the behest of the federal government, operating on federal lands, using federal equipment, its access to technology and facilities guaranteed by federal legislation, pumped with federal investment money, and with prominent national politicians serving on its board of directors. Anyone who gets to know about USEC gets uncomfortable with it. It is entirely unclear what this entity really is, whether it will exist tomorrow or the day after the next presidential election, and whether this quasi-nonentity can be relied upon to launch or manage any new production venture.

USEC has been financially unstable, subject to wild fluctuations in its stock price, and the subject of ongoing speculation as to its viability. (Matt Wald in the *New York Times* has suggested that plans are afoot to renationalize USEC.) USEC has had to defend itself against at least one class action lawsuit by investors charging that the company engaged in fraudulent misrepresentation of the viability of ACP's predecessor, the AVLIS uranium enrichment program. Locally, ACP is sold to the Piketon community as a done deal and a sure bet. On Wall Street and in Washington, there is a growing consensus that ACP is a confidence scheme, intended only to dupe investors long enough to maintain inflated payrolls, while renationalization details are worked out behind the scenes. Surely, NRC must conduct a thorough investigation of USEC's financial, management, and planning practices as part of the licensing process.

How the public-private divide will evolve over the course of the centrifuge project is entirely unclear. The original privatization fervor that accompanied USEC's creation is as gone as USEC's stock price. Now it is clear that USEC's only hope for "private" survival rests on access to federal facilities for waste processing and disposal, paid for by American taxpayers. If USEC really is a private endeavor reliant on market economics, why doesn't NRC deny this license application, so that USEC can pursue its laissez faire ideal on private land, far away from any public investment, using private venture capital, with a privately funded repository for its waste? And if that scenario is as unlikely as we all know it to be, why are we enduring this charade?

Respectfully submitted,

Geoff Sea 2/28/05

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List of Exhibits

A. Map of Historic Sites in relation to American Centrifuge Project created by Petitioner Geoffrey Sea.

B. Statement of Charles Beegle, former Professor of Education at the University of Virginia, widower of Jean Rittenour and owner of the historic Rittenour Home at 3755 US Highway 23, Piketon OH 45661-9703.

C. "A Pigeon in Piketon" by Geoffrey Sea, *The American Scholar*, Winter 2004, Volume 73, Number 1, pages 57-84.

D. Letter from Robert Glotzhober, Curator of Natural History, Ohio Historical Society, to Barb Powers of the Ohio Histroric Preservation Office, 11/9/04 (letter is undated)

E. Statement of Jerome C. Tinianow. Executive Director of Audubon Ohio and Vice President of the National Audubon Society.

F.. E-mail correspondence from Roger G. Kennedy, former director of the National Park Service and Director Emeritus of the National Museum of American History, author of *Hidden Cities: The Discovery and Loss of Ancient American Civilization.*

G. Resume of Roger G. Kennedy

H. Statement of John E. Hancock, Professor of Architecture and Associate Dean at the University of Cincinnati, Project Director of "EarthWorks: Virtual Explorations of the Ancient Ohio Valley"

I. Letter from Barbara Powers of the Ohio State Preservation Office to Geoffrey Sea, 12/22/04

J. Transfer Deed for the Barnes property, 1921

K. Powerline easement for the Barnes property, 1953

L. Photograph taken by Petitioner of the proposed ACP buildings from the back fence line of the Barnes property.

M. Letter from Linda A. Basye, Executive Director of the Pike County Convention and Visitors Bureau, 10/21/04

N. Statement of Karen Kaniatobe, Tribal Historic Preservation Officer of the Absentee Shawnee Tribe of Oklahoma in Shawnee, Oklahoma.

O. Plate XXIV from Ephraim Squier and Edwin Davis, *Ancient Monuments of the Mississippi Valley*, 1848.

P. Generalized Model of an Ohio Hopewell Community, from Paul Pacheco, "Ohio Hopewell Regional Settlement Patterns," in *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, Ohio Archaeological Council, 1996, page 22.

Q. Statement of Thomas F. King, preservation consultant, author of four books on federal preservation including *Federal Planning and Historic Places: the 106 Process*

R. Resume of Thomas F. King

S. Photograph taken by petitioner of Scioto River at point where the creek of the Barnes Works enters it.

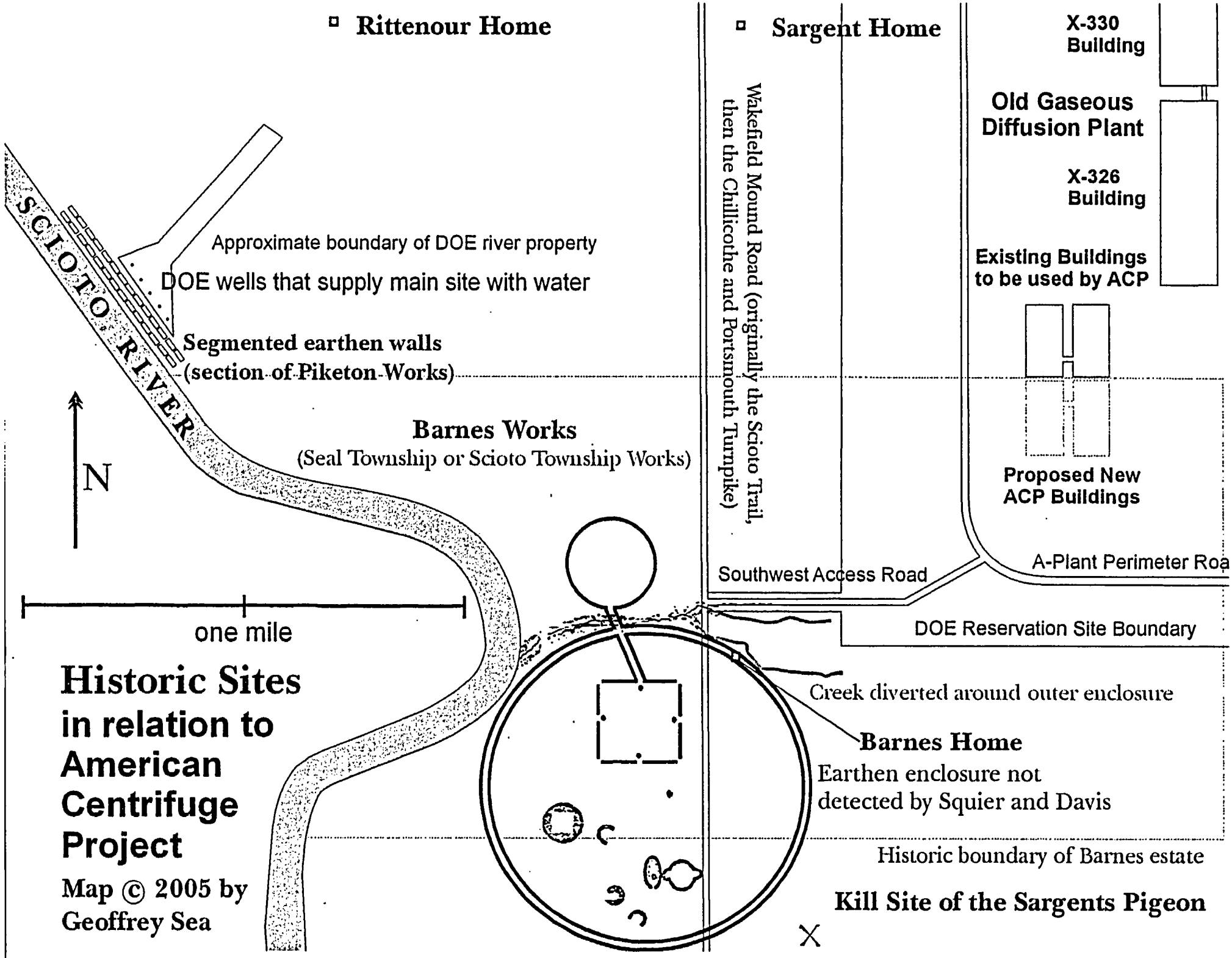
Rittenour Home
Sargent Home
X-330 Building
Old Gaseous Diffusion Plant
X-326 Building
Existing Buildings to be used by ACP
Proposed New ACP Buildings
Wakefield Mound Road (originally the Scioto Trail, then the Chillicothe and Portsmouth Turnpike)
SCIOTO RIVER
Approximate boundary of DOE river property
DOE wells that supply main site with water
Segmented earthen walls
(section of Piketon Works)
Barnes Works
(Seal Township or Scioto Township Works)
N
one mile
Southwest Access Road
A-Plant Perimeter Roa
DOE Reservation Site Boundary
Creek diverted around outer enclosure
Barnes Home
Earthen enclosure not detected by Squier and Davis
Historic boundary of Barnes estate
Kill Site of the Sargents Pigeon
X
Historic Sites in relation to American Centrifuge Project
Map © 2005 by Geoffrey Sea

EXHIBIT B

Brookhill Farm
2163 Scottsville Rd.
Charlottesville, Va 22902
27 February 2005

Nuclear Regulatory Commission

To whom it may concern

Re: Piketon, Ohio Centrifuge Operation

As a neighboring landowner, I raise the following concerns about the expansion of the centrifuge operation at the Piketon, Ohio Plant:

1. I own the Scioto Trail Farm on State Route 23. Presently the farm is approximately 370 acres. The major portion is on the west side of State Route 23 and goes to the Scioto River.

2. The farm has been in my wife's family for generations. The Rittenours, Sargeants, and Barnes were influential in the history of the Scioto Valley

From the oral history of the Indian culture of the Scioto Valley, stories are told of the Indian foot races along the lower portion of the farm. The historic nature of the property should qualify it for the National Historic Registry.

3. During 1966, the NHPA legislation was passed which mandated that government agencies had a moral and legal obligation to weigh the impact that projects have on historic surroundings. The government took 31.421 additional acres for a permanent easement during 1982. This was for a well field along the Scioto and for pipe lines and a road. Never was the NHPA legislation addressed.

4. At one time the farm was over five hundred acres, The DOE took a large portion of the farm during the early 1950s. There was a great projection on

the financial benefits and jobs that would be gained with the nuclear energy project. The only thing that it did was ruin a once beautiful farming valley. There are few, if any, large landowner farmers remaining on their land. From my perspective, the plant has been a detriment and enlarging it will continue that degredation. In the process, it will destroy more Hopewell Indian relics and more of the early history of Ohio will be lost.

5. As an out of state land owner, I was not aware of the enlargement of the centrifuge plant. I would have objected earlier. This letter is written in support of Geoffrey Sea's intervention.

Sincerely

Charles W. Beegle

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EXHIBIT C

A Pigeon in Piketon

GEOFFREY SEA

It happened here in Piketon, Ohio, on just about the last day of the last winter of the nineteenth century—a day when the air was sweet with centennium spring and the creeks were full from freshets of snowmelt and a lone silver-blue passenger pigeon was sighted by an observant young boy.

Not to be confused with domestic pigeons bred from primarily European stock, the passenger pigeon, *Columba migratoria*, was wild and American and abundant. As late as 1870, the American wild dove, as it was also called, was the most populous bird in the world—one in three of all the birds in North America—and this valley was the center of its range. Here the silence of the central continent would be broken in the breeding season by the blended coos and flutters of the doves. Close by, on the Ohio River, John James Audubon himself was swarmed by a mile-wide flock that streamed continuously for three days. By sampling, measurement, and calculation, Audubon made count of its particles: "One billion, one hundred and fifteen millions, one hundred and thirty-six thousand" individual birds, more or less. In one cluster, as many souls as people then on earth.

But the Piketon boy had never seen such a dove, and he thrilled at its colors: throat and breast a shimmer of clay gray-green; hindneck reflections of copper, silver, and gold; head of nickel gray with radiant red eyes.

That day, the wayfarer stopped to feed near the Sargents Grain Mill, then seemed to float, with an undulatory charm, to the high tree branches above. Before this vision of grace, softly so as not to startle, the young naturalist kneeled in observance. So impressed was the bird-watcher with the bird—as it paused, for a time, to split one stolen kernel—

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that he drew a deep breath, he steadied himself, and then, with just one touch of the finger, BLAM!, he shot the giblets out of the damned thing.

That was the last passenger pigeon ever sighted in the wild.

Triumphant, the boy carried the torn body north up the road to Mrs. Clay Barnes, the former sheriff's wife, who pieced it together, stuffed it, and sewed black buttons into the eye sockets.

I saw "the Sargents Pigeon," its colors faded, enshrouded in dust, mounted on a wall at the Cincinnati Zoo. One shiny shoe-button eye was gone.

Piketon is a little pit stop of a town, midway between Friendship and Knockemstiff, at the end of the flush of Pee Pee Creek, dead center in a slow cascade of camel-hump hills called the Lower Scioto Valley. Its liveliest night spot is the Duds'n'Suds Laundromat.

But Piketon's place on the map is marked "Atomic Reservation." It's a strange phrase, as if something wild or native were left to roam here, while what is here is a free range of factory, a sprawling federal nuclear-fuels production complex, the largest contiguous area under roof in the world.

The vast size of the A-Plant, as it is called by those who live around it, creates a confusion of scale. From a distance, the three main process buildings look like squat pontoons floating in a broad bowl of cereal grains, rimmed by natural hills. Only when you are against a wall of one can you tell that each is eighty feet high and half a mile long. All that is human-scale is then made minuscule by a featureless edifice of cement. Construction required the destruction of one small town and an archaeological site, and the relocation of four and a half million cubic yards of earth to make room for half a million cubic yards of concrete. The largest electrical switchyard on the planet is here.

This plant, this snaking mile-long arterial system of pipes, ducts, chambers, motors, and electrical lines through which sublimed crystalline uranium, gaseous and greenish, has continuously flowed, periodically pumped through huge assemblages of nickel filters, was designed to separate the isotopes of uranium. This Niagara of atomic stream and metallic stone has been called, by those who work it, the Cascade.

Surrounding the Cascade, turquoise cylinders of depleted uranium rust in soil-swept mounds like the pellets of a giant serpent that has fouled its own nest. Next door hulks the huge empty shell of the never-finished Gas Centrifuge Enrichment Plant, one of the world's costliest uncompleted structures.

The Cascade, or Gaseous Diffusion Plant, is now in the process of being closed, but in its prime it accounted for about one percent of the nation's annual electrical demand. It is one of those pertinent and impertinent facts, comprehended in all of its implications only by prankish gods and petty bureaucrats, that not long ago the pipsqueak town of Piketon, population 1,907, consumed as much electric power as the city of Los Angeles.

Toward the end of ancient Rome, there were two types of foreteller. One, the *auspex* (from whom we get the word *auspicious*), would foresee events by observing the flight of doves. The other, the *augur*, would get his hands dirty—he would feel into the future by groping in the entrails of the birds.

Auspiciously speaking, the fall of the last American wild dove, at the first bud of spring in 1900, was a singular sign of the times. It was, after all, the year of the convulsion, the year that Friedrich Nietzsche, who had said that God had died, died.

It was the year that Max Planck explained matter as energy bundled into units—"undulatory particles"—that flow and scatter like waves on the sea or doves on the wing. Inspired by one particular pigeon that Wilbur had seen in Ohio, the Wright brothers made their first glider flight. Henri Bergson explained laughter as liberation from mechanical constraint. And William Crookes dissolved uranium ore, trying to tap the power of its fresh-found emanations—trying, with "the touch of the magic wand of science," he said, to cast the closing century into shade.

The approach of 1900 had given rise to a millennial cult in contraposition, a wave of fanatical optimism with faith in impending grace brought by the new unholy trinity of science, technology, and industry. Leading the movement, Frank Seiberling named his Ohio tire company after the inventor of vulcanization, but with a double entendre in mind. When the auspicious year arrived, Seiberling chose as company icon the "fleet foot" of Mercury. Dove wings sprouting from its ankle, it was interposed between "GOOD" and "YEAR" to drive home the point.

Mutation was discovered in the gene during that good year. And Ernest Rutherford opened his radioactivity lab in Montreal; it was the year he introduced the concept of "half-life" and the phrase "atomic energy," in a first premonition of the modern transmutation of elements.

According to Henry Adams, it was the year that the icon of our civilization transmuted from the Virgin to the Dynamo, by which he meant that the radiant atom supplanted the radiant madonna as our worshipped source of sublime power. And so, Adams felt, it was the year of the sudden suspicion that civilization might escape us after all.

Eight decades later, as the suspicious century spasmed toward its close, I came to Piketon as an augur. I worked for the union that represented A-Plant workers, and initiated a project to reclaim the site and convert the complex to alternative use.

But mostly I tried to come to grips with the meaning of the place. Feeling around in the long undone innards of the passenger pigeon, I hoped to find some sign of just how things might go for us. I hoped, as well, to find the Sargents Grain Mill, the only findable final station for a species in the wild. And I hoped to mark that spot in some appropriate way.

The passenger pigeon was the most communal of backboned species—"never comfortable unless it was crowded," in the words of the ornithologist Arlie Schorger. Its flocks were great colonies in which individual birds behaved like cells of a single colossal organism. It did not just coo and sing like other birds; it squawked and chattered as if to evolve a form of speech suited to its social relations. Witnesses would describe migrations as "mighty roiling rivers" and "coiling flying serpents," revealing some primal association of water, serpent, and wild dove.

The story of its quick extinction reads like a short course in genocide. Weapons: guns, clubs, poles, sticks, stones, traps, nets, smoke, fire, and sulfur-bombs. Delivery vehicle: the railroad. Command and control: the telegraph. Roosting grounds were methodically raided, nestlings massacred by the hundreds of thousands.

More than a hundred methods for slaughtering pigeons were tried and tested, all exploiting the determination of the species to congregate. Cannons loaded with grapeshot were fired into flocks. Exploding rockets were occasionally used. Elaborate mechanical nets and traps may have killed the largest numbers, and a patent was given for a mechanical cat designed to startle pigeons off the ground to save time. One innovation was to shoot down a trench laced with grain, so as to kill many birds at one shot—a foreboding of the modern concern in mass homicide for rationing ammunition. Sometimes the grain was soaked in whiskey to poison the pigeons and avoid any use of shot at all.

In Zoroastrian iconography, doves were depicted as metamorphic assistants, helping man ascend the ladder of progress from primal chaos to agricultural civilization. Through American technology, in the words of one witness, wild doves became "martyrs to progress." Ladders were erected near nesting flocks so pigeons perching in dense packs on the rungs could be raked down by rifle fire.

A committee of the Ohio legislature, convened to protect the state against grand larceny of seed, ruled in 1857: "No ordinary destruction can lessen them or be missed from the myriads that are yearly produced." As a preface to the propaganda of mass killing, the doves were accused of obscene fecundity and a predisposition toward thievery, with the use of the word *destruction* in place of *violence,* to deanimate the birds, portraying them as errant property, not as living beings. Thus the term *weapons of mass destruction* entered the language.

The burning of gas and sulfur under roosts in fact represented an important stage in the development of chemical weapons. And the use of the intentional firestorm for mass slaughter was pioneered. One observer wrote:

> The grand mode of taking them is by setting fire to the high dead grass, leaves, and shrubs underneath, in a wide blazing circle, fired at different parts, at the same time, so as soon to meet. Then down rush the pigeons

in immense numbers, and indescribable confusion, to be roasted alive, and gathered up dead next day from heaps two feet deep.

The technique of encircling a population with fires that combine into a suffocating storm moved from animal testing to human trials in the Indian Wars. Specifications for the grand unsecret weapon were relayed through frontier novels that advertised expiational flame as a means to liberation. Thus the "Torch of Liberty" was passed to Europeans, who, with aerial bombardment, set fires in wide blazing circles so as soon to meet—first the Germans at Guernica, then the British in reprisal at Hamburg.

Reclaiming the methodology, the United States began to design incendiary bombs with the aim of consuming the oxygen over a wide area, rendering shelters useless. These were tested on Darmstadt and Berlin, then infamously on Dresden, where heaps of burnt and choked bodies were later gathered up like so many pigeons. In the Pacific, jellied gasoline—napalm—replaced phosphorous as a torch, so that in Tokyo, in a single night, eighty thousand human beings could be roasted alived. Jellied gasoline was then replaced by enriched uranium at Hiroshima. Consummate freedom for the firestorm.

A giant dove-winged foot of Mercury on Route 23 marked the west entrance to the A-Plant, then run on contract by the Goodyear Atomic Corporation. When I moved to Piketon, the union arranged a room for me at $20 a week at the Madeira Motel, on the highway nearby. Next to the motel was another big sign, advertising "The Oldest Flea Market in Ohio." Stolen contaminated scrap and tools from the A-Plant had been illegally sold at such venues, so on one Saturday I decided to check out its ramshackle stalls and tailgate vendors—the junkyard front lawn of an Appalachian atomic plant.

There, among old and broken machines and tangles of antique wood and wire that may have been remnants of century-old pigeon traps, I came across Bud Galloway. He was displaying a glass-cased collection of spear points and other artifacts. Many were from the people known as the Mound Builders, who had vanished mysteriously some thousand years ago, leaving the region dotted with elaborate earthwork remains.

Bud wore a union jacket and a winged-foot A-Plant security badge with the number 00013. He explained that he was the thirteenth employee to hire on with Goodyear Atomic when work started in 1952.

I visited Bud at his hillside farm, where he took me to the loft of his barn to show me buckets and buckets of sorted artifacts, one of the largest collections in the state: spear points, hammer stones, pottery pieces, effigy pipes, hand tools, carved animal bones. One remarkable thing about stone and clay artifacts is their sensuality. These are not only for viewing; they beg to be handled, for you typically can't figure out a piece until you get a grip on it and feel the thumb hold, its gravity playing in your palm.

We moved to the main house, where Bud talked about his job at the A-Plant, which was really a way to keep himself occupied in the off-season. As a Cascade maintenance mechanic, he would work on a calm-and-crisis schedule. Long periods of idleness would separate stints of frantic and dangerous work, a situation common in process industries and hard on a bred-in-the-bone farmer like Bud. He had never read much, and had never acquired any books, save for a twenty-one-volume set left to him by his father—*The Archaeological History of Ohio.* So during A-Plant "slack time" he read the set cover to cover.

Preparatory reading accomplished, Bud had ample opportunity for archaeological practice, residing, as he indicated with his hands, at the intersection of two natural boundaries that form a giant cross. North-south runs the remnant valley of the Teays River, a mighty stream of Mississippian proportions that once flowed north, draining most of Appalachia, its channel once engulfing all the land of Bud Galloway's estate.

At the end of the last ice age, the glacial boundary nearby started to recede, unweighting the northern continent, making this land a pivot point. At some unearthly earthly moment, the unthinkable happened: the North American tectonic plate tilted upon the fulcrum of this farm; glacial melt poured south; the Teays reversed direction, reborn as the Scioto.

The springs and mineralized pools left behind have drawn congregations of wildlife, with following bands of human hunters and settlers, for the past ten thousand years. Mastodon herds wayfared here, their bones found in ceremonial mounds and in association with human weapons nearby. Now the creeks and the plows were opening up the whole mix to Bud's self-educated eye. He could barely walk down a corn row without kicking up or spying some new find. One of Bud's discoveries that I especially liked was a small stone bird effigy. It could well have been inspired by a passenger pigeon.

A week of cloudy skies in Paris led to the discovery of radioactivity in 1896, when uranium salts, left in the dark, were found to emit strange energetic rays. But the Radiant Revolution of 1900 depended on an even more fortuitous event—the collaboration of Ernest Rutherford and Frederick Soddy for the three years that they could stand each other.

Both men were British-educated scientists who found themselves, in 1900, on the faculty of McGill University, but they had opposite characters and first encountered each other in debate. Rutherford, the son of a mechanical engineer, was a structuralist, a conservative, and an Anglican of the first rank, known for marching high-step through his lab singing "Onward, Christian Soldiers." It was Rutherford who had discovered the first subatomic particles, which he named alpha and beta in right linear order. Later, he would use these "bits and pieces being flung off the atom" as "can-

non balls" to bombard atoms of gold and thereby deduce from their "bounce" the fact and measure of the atomic nucleus. The Rutherford Atom was the triumphalist modern atom—hierarchical, vacuous, a minute engine of mechanical parts. Upon splitting an atom for the first time, Rutherford proclaimed, "I have broken the machine and touched the ghost of matter."

Soddy, who in features and luminance prefigured Peter O'Toole, was something of a mystic, with druidical and populist inclinations. He had wandered to Montreal in search of high culture amid the famed North American wilderness, arriving at the first bud of spring in 1900. His love of wild nature drew him likewise to the phenomenon of radioactivity, on the suggestion that something at the core of everything was untame.

Though it took the two men working together to comprehend the being and becoming of the radiant atom, it was the younger Soddy who had the key insight that atoms of thorium and uranium, by particle emission, were metamorphosing into atoms of other elements. Soddy appropriated the word *transmutation* to describe the process, though Rutherford thought this too extreme and preferred to say "spontaneous disintegration." The transmutation theory nonetheless became their joint project, resulting in a Nobel Prize—awarded solely to Rutherford.

Throughout their collaboration and after, Rutherford employed mechanistic models for atomic phenomena, while Soddy sought to vitalize matter, transforming the physical chemistry of the nineteenth century into a science of vibrant life. Nature had earlier seemed confined to combinations of some few or few dozen elements, and according to the atomist doctrines of Democritus and John Dalton the atoms of each element were identical and immutable, like universal interchangeable parts. Starting with Soddy, a thousand elemental flowers bloomed; there came the pure and the variegated, perennials and ephemerals, the natural and the bred.

Soddy coined the term *isotope* to denote the new varieties, but he often called them "species," observing and cataloguing their behavior in the manner of a field biologist. The reference to organic evolution was explicit. Darwin had turned distinct and changeless biological species into graded varieties capable of spontaneous and induced transmutation; Soddy did the same for species of atoms.

For Soddy, radioactivity was radical. In precisely the manner that spirit bodies emanate light at each stage of transubstantiation, the radiant atom radiates energy as it metamorphoses, shedding layers in stages. The wild proliferation of elemental types thus signified a larger philosophical transformation: the collective concept of element became just a label for transient form. The new fundament became the freewheeling atom in transmigration. And with the atom as individual, a passenger through aggregations and disaggregations and change, matter itself acquired the mortality that is every individual's price.

The kill site, identified in the zoo display as "the Sargents Grain Mill," had to be somewhere close to the union hall on Wakefield Mound Road. In 1900, the road had been called Scioto Trail. Mrs. Clay Barnes, who mounted the fallen dove, had lived there. A remnant street sign for Sargents Road still stood nearby, marking only a short dead end against the Atomic Reservation.

A "biography" of the Sargents Pigeon had been published, and I read it for clues. The solitary male protagonist—an atomic individual that exemplifies the vanished mass—flies in the classic hero's bind between dying social obligations and preservation of his essential liberty; his last travails become those also of his race. I knew this account to be imaginary (for one thing, the actual specimen is female), yet it held a certain romantic appeal. It placed the killing "in a cluster of oaks and hickories" on the east bank of the Scioto River.

As a boy, I wandered riverbanks and streambeds in the woods, never without making some crucial discovery, and it seemed that the river was all that was left of the suspect terrain not transmogrified by the A-Plant. So, without a direct way of locating the granary, one day I told my colleagues at the union hall that I was going to do some reconnaissance by foot. They tried to stifle their laughter.

I departed from the bridge crossing of the federal highway to the tangled ground along the Scioto. I didn't get far. The problem is that there isn't a riverbank anymore. All I encountered in my river adventure was the detritus of mechanized farming: irrigation pipes, waste culverts, fertilizer residues, expanses of chemically enriched mud, barbed-wire fence. No trails, no animal tracks, certainly no clusters of hickories. I went in the back door of the union hall and discreetly tried to use the shower.

Uranium is ubiquitous, more common on earth than mercury or silver—a fact exploited by the nuclear industry for public relations.

At the end of winter in 1978, a hot cylinder of uranium hexafluoride fell nine inches onto concrete at Piketon and cracked open, releasing, *en masse*, 14,281 pounds of uranium to freedom (plus 6,844 pounds of affiliated fluorine). Some few unlucky escapees were hunted and recaptured on the ground, but roughly a ton of emancipated uranium managed to melt into snow and swim to deliverance down to the Scioto River. Three-quarters of all the uncaged particles took flight into the atmosphere, lifting off in waves of flustered evaporation. (Imagine eight tons of fluorine-winged uranium atoms flocking to a dark mighty cloud.)

In air, uranium hexafluoride shimmers gray-green while the molecules interact with water vapor. Transfiguring, the swarm at Piketon migrated southwest with the wind, just past the chain-link perimeter fence, toward Wakefield and Bud Galloway's farm. To put this "in perspective," a plant manager told reporters, "You can go out in your garden and pull up your flowers and get uranium on your hands."

Indeed, you can find uranium in your geraniums, but it won't be enriched uranium unless you live near a place like Piketon. Enriched uranium has been boosted in its light isotopes, U-234 and U-235, lighter atoms that are more unstable, prone to the wild fluster of self-sustaining chain reaction at some magic threshold of density and population. Heavier U-238 vanishes more slowly, and now accounts for 99.3 percent of all natural uranium on earth. That is why uranium must be enriched to make a bomb, a formidable challenge, since no ordinary chemistry can distinguish among the species of a single element.

More than a hundred methods for separating the isotopes of uranium were tried and tested, all employing tricks to make the atoms of like species congregate. Electric guns shot charged atoms into varying arcs across magnetic fields. Thermal devices excited light molecules off the ground while the heavy selectively dropped. Centrifuges spun the mixture to trap the light on the inside track while the heavy flew off with greater force. Diffusion, which won the early contest, used elaborate mechanical pumps to force flying swarms of atoms through microporous nets.

Nearly all the methods involved converting uranium ore to gas, and the only simple gas known was UF_6, uranium hexafluoride, which had the convenient property of easy transubstantiation: its triple point—the temperature and pressure at which it wavers between solid, liquid, and gas—is close to the conditions of a hot summer day.

The inconvenient side of "hex" accounted for its nickname. Upon contact with air or water, hex breaks down to caustic acids and bone-seeking fluorides. At Piketon, a state biologist once hustled me into his car to reveal against orders that local wildlife was being poisoned by fluorides from the plant. (Hunters on the site now must send in the liver and one kidney from every deer killed to a lab for radioisotope testing; but there is still no testing for fluorides in bone.) Hex and its consequent hydrofluoric acid eat through nearly every metal and make a mess of flesh with fumes that have a triple point of their own—they are at once corrosive, chemotoxic, and radioactive. Hex has that eerie metallic fluoride taste, and a plant electrician described the look of a hex release to me this way: "Stuff was just hanging in greenish-white blobs like some scary monster movie. It was horrifying to walk through there."

To early workers, "hex" meant what it usually does: a curse, a harbinger of bad luck. Literally and figuratively, isotope separation became a matter of "hexing the uranium," turning the natural abundant element to something unearthly and inauspicious. This is how uranium acquired its aura of sorcery and taboo. In Germany, the problems and paranoia stopped progress toward a uranium bomb. At Berkeley, a case of mononucleosis was first attributed to the "hex hex," and uranium work there was dropped.

In making nuclear weapons, no design or assembly challenge has compared with that of uranium separation. Occult with curse and specter, enrichment has always been the central secret of the atom bomb, the necromantic trigger for mass violence by nuclear means.

For its aerial acrobatics and hovering on the brood, its superendurant powers of migration and otherworldly croon, the dove is the common symbol of covenant, revelation, and transfiguration. When "in a mob of the feathered race," James Fenimore Cooper could not help feeling "as if some unearthly influence reigned in the place." Chief Pokagon of the Pottawatomie was convinced that the Great Spirit had provided the doves "with means to receive electric communications."

To kill the dove as such is to quell the dove within. The Huron believed that human souls are resurrected as passenger pigeons, and early Slavs also thought the departed returned as doves. In Hebrew and Arabic, the voice of prophecy is "the crooning of the pigeon." Eros, the naked boy in the company of supernal doves, signifies the primal atom in affinity for union; his arrows are the capacity he borrows from the birds for action at a distance. Jung saw the dove as "the fructifying agent"; it is the pneuma, heavenly spirit and Holy Ghost, seed for transformation of the soul.

The English language maintains a schizoid attitude toward the animal, retaining *dove* for the sacrosanct symbolic bird while introducing *pigeon* for its eradicable or edible incarnation. Indeed *dove* shares a common origin with *divinity* itself, related by their common root in the Roman practice of augury, soothsaying, or divination.

But many gods compete for worship in this world, and Profit has always shunted prophecy aside. "This whole pigeon trade was a perfect Godsend," wrote one carcass merchant in a quaint little essay called "The Pigeon Butcher's Defense." He went on, "The 'pirates and bummers' left some $35,000 in good greenbacks right among the most needy of these people. . . . It put scores of honest hard-working homesteaders on their feet; it increased trade, and, if sent by a special act of Providence, could not have done more good."

With one small psychological inversion, the sacramental animal serves a sacrificial purpose, too. So when the larger flocks suddenly stopped appearing, it was bloodshed as usual, on the stupid rumor that the wily pigeons were hiding out, refusing to return from winter roosts. Conservation attempts were too little and too late. Save-the-pigeon committees barely got off the ground when scandals broke involving organizers caught hunting their own last share of the vanishing birds. Even after the shooting at the Sargents Grain Mill, folks half expected the wild dove to return.

Harold Clay Urey was a Midwestern country boy who loved the woods and streams so much that wildlife pursuits delayed his schooling. When he made it to college, in 1914, he majored in zoology, but following Soddy, Urey saw that the real naturalists of the twentieth century would be

isotope chemists. So he switched fields and became Soddy's most illustrious acolyte. The discovery of heavy hydrogen and a means for separating it won him a Nobel Prize, which he followed with shrewd techniques for separating isotopes of the other organic elements. On the wall of his office he kept a hand-scrawled evolutionary tree, of the known species of elements and missing links—an invocation of Darwin's typological charts.

When the directors of the Manhattan Project needed a man to head up uranium separation, they went straight to Urey, then at Columbia. From the start, he was dubious about the prospects for diffusion. It was less efficient and less affordable than the alternatives, and it likely could not produce enough uranium in time for use against the competing Germans.

The theory was intriguing. Imagine a cocktail party where the lighter guests are circulating with greater average velocity. If narrow doors to a second room are opened, those more agile partiers will tend to filter through first—even more so as the party heats up and pressure is applied.

But the holes had to be sized to suit the purpose, just big enough to catch the straining heads of the hex molecules. Each barrier had to have billions of these molecular portals, and each pore, despite its infinitesimal size, had to stay clog-free. Even then, hex molecules of U-235 and U-238 differ in weight by less than one percent. A single pass through a thin barrier could accomplish only a small degree of separation. To get to bomb-grade, millions of passes would be required, and this was the origin of the scale paradox. Sifting atoms required the biggest factories on earth.

One early manager compared the task of educing U-235 by gaseous diffusion with finding "needles in a haystack while wearing boxing gloves."

That we bury trash and dig up the dead, the former with ceremony, the latter without, surely must count among the strangest of our customs. In 1952, a large earthen mound containing the communal remains of people we call Adena was destroyed on the new A-Plant site, its memory preserved only by changing the name of the old Scioto Trail to Wakefield Mound Road. A "classified burial ground" was located in its stead, so the ancient bones could be replaced by a particular kind of modern waste.

The cascades required so much nickel that the metal had to be preserved by recycling old diffusion barriers into new. This was accomplished at a Dickensian facility in Huntington, West Virginia, called the INCO Nickel Powder Plant. The INCO plant quickly became so hazardous to operate, or even to be close to, that it had to be shut down. Not only was it a source for airborne nickel and uranium, but most of its equipment had become coated in a top-secret chemical called nickel carbonyl, described banally in declassified documents as "a colorless, volatile, flammable, poisonous residue."

In 1978, the INCO plant was demolished. In four railcars and fifty-nine truckloads, its most contaminated pieces were brought to Piketon and buried in the pit left from the excavation of the old Adena mound.

Noting that work clothes were confiscated afterward and sealed in plastic bags, the union complained that the factory's funeral had taken place at night, without protective equipment or warning of hazards involved. Goodyear responded offhandedly that "no such operation had occurred."

To get the official story, the union sent me to Oak Ridge. There a lawyer named Jim Foutch smugly handed over what he said was the entire trove of available documentation: two curt memos and one half-page letter. Then, with a wink, he asked me how I had liked the place where I just had slept. I hadn't mentioned where I was staying. It was his way of telling me that the Oak Ridgers had me in their sights.

The pigeon trade became, for a time, a major industry of the Midwest, employing off-season farmers, spurring invention, and giving rise to the modern nexus of communication and transportation by which flocks would be tracked and raided through telegraph and railroad coordination.

Not content just to follow capricious migrations (a hunting style considered primitive), modern "pigeoners" engaged elaborate ruses to trick the flying hordes into ambush.

Some few birds—the ones that "didn't flap so much"—were carefully selected, trained, and hand-fed. Then their eyes were threaded shut and they were tied to stools to act as decoys. Hence the term *stool pigeon.* The stool, which was an intricate mechanical device, would jerk up and down at the touch of a lever. This would make the stool pigeon flutter its wings, creating the illusion of freedom that was necessary to draw in a passing flock.

Other captives, based on rated levels of compliance, were blinded, booted, and leashed to serve in various capacities as puppets and decoys. "Hoverers" were anchored by threads so that their frantic efforts at escape would resemble brooding congregation. "Flutterers" were controlled by strings hidden in poles and flown like kites until they dropped.

As Cooper described it, "Arrows and missiles of every kind were in the midst of the flocks . . . one 'fell swoop' of destruction." Leatherstocking, the hunter-hero of Cooper's novels, derided the wasteful violence. "This comes of settling a country!" he complained. "I see nothing but eyes, in every direction, as the innocent sufferers turn their heads in terror."

Attracting the lead birds of a flock brought prodigious rewards for a local economy, so pigeon-baiting became a field of rivalry among communities. Scoring an annual nesting, which could stretch for forty miles, was the jackpot—a boon for local business, accommodating the influx of hunters. Rising to strategic alliance, pigeoners banded together in professional associations, in part to lobby for public assistance. Their lasting achievement (not counting the bird's extinction) was the institution of national time with

synchronized time zones, first by the railroads, then by governmental authority, so uncoordinated localities could overcome their disadvantage against the fast-moving flocks operating on communal time.

Speed, power, standardization, instantaneous communication—these traits of the pigeon colony were emulated in hunt by protomodern American Man. Technology was the means for predatory mimicry; indeed, the gadgeteer reputation of the modern Midwesterner originated in the assault on pigeons through popular technics. Myriads of tools and machines were devised, and constantly improved, to aid in the pursuit, capture, butchering, packaging, shipment, and serving up of the doves. This is how blacksmiths and liverymen first were transformed into mechanics, and why the American bicycle, automobile, and airplane all emerged in Ohio and Michigan, the heartland of the pigeon hunt, filling the void in employment left by the bird's demise.

"SPEAK TO THE EARTH AND IT SHALL TEACH THEE." That was the motto in stone at the threshold of the uranium-separation laboratory, a secret state venture underneath a chapel's courtyard, at the heart of Columbia's main campus in Manhattan. With a workforce of seven hundred, Harold Urey set about his assigned task of creating new barriers with submicroscopic pores and new ways to connect them in looped arrays dubbed "cascades."

The British had tried a batch process, grouping diffusion tubes in unconnected clusters. The Columbia idea, compelling in its elegance, was to link the diffusers together in one continuous particle stream. Nickel, the only common metal resistant to the corrosiveness of hex, replaced copper as a barrier material, which itself had replaced the original diffusion membrane, a white pipe clay made from kaolin. Compressed powder from the INCO plant—the first idea for simulating the porosity of clay in metal—was replaced by electrodeposited mesh, and then the two were combined for three pilot cascades built secretly right in Columbia's labs.

Before the war, Urey, the son of a part-time pacifist minister, had voiced the aspirations of his scientific generation: "We wish to abolish drudgery, discomfort, and want from the lives of men and bring them pleasure, comfort, leisure, and beauty." That he then found himself the chief administrator of an underground lab for the A-bomb project was a fact he abhorred.

But then a funny thing happened: Urey became ensnared in his own atom nets, entrapped not only by his circumstance but also by the gadgetry of atomic automata, which became for him an analogue of the biological systems he so missed. The British, after all, were using the word *membrane* for what more mechanical Americans called a *barrier,* and when a piping system was developed for recirculating unenriched uranium back through the Cascade, it was called "the rabbit," on the analogy of lab rabbits who stymied metabolic researchers by eating their own pellets at night.

As Urey's monster, gray-green under its skin, started to move in his basement laboratory, it was clear that this was more than physical science. The Cascade pulsed with the selective transport of fluids across membranes. It had a nervous system of electronic sensors and effectors, a musculature of vacuum pumps, and a nickel-plated circulatory system of hot swirling radiant particles, progressively enriched toward its head, depleted toward its tail. At industrial scale, it would resemble a living being even more—the self-actuating governance of its servo-mechanisms; the dialectical embeddedness of its feedback loops; and its self-sufficiency, requiring workers only to keep the creature fed, mend its injuries, and clean up its mess. Its life would be reflected in its irreversible death. Once a cascade is shut down, it cannot be resuscitated, because its vessels and tissues are locked in rigor mortis by congealed uranic blood.

With gaseous diffusion up and staggering, Urey knew he had created a golem, and he feared it could get out of control. He lobbied against an industrial-scale cascade, seeing that the choice would have a consequence—it would be a commitment to permanent production of atomic bombs even before a first device was built. One of Urey's mentor's, Niels Bohr, had said it could be accomplished only by "turning the whole country into a factory."

Urey's protestations were overruled. Diffusion meant post-war reindustrialization incubated at secret government laboratories, all funded out of America's first military "black budget." So appetite-whetting were the prospects that half a billion dollars, ten thousand workers, and precious stockpiles of nickel, copper, silver, and gold were diverted to build the first big cascade, at Oak Ridge. Seven thousand tons of nickel were required, which represented nearly the entire national stock on hand—the reason World War II "nickels" were minted from nickel-less silver alloy. The year was 1944, the time of the severest war deprivations, a critical phase of conventional fighting, months after the German A-bomb project was determined to have failed.

Production at Oak Ridge was delayed for days when a bird, bent on martyrdom, perched across electrical lines, shorting the system and crashing the whole cascade.

Urey withdrew from applied research and devoted much of the rest of his life to stopping and controlling the use of atomic energy. He perhaps was always haunted by something he had said before the war, before any conception of a bomb project: "You may bury our bodies where you will, our epitaphs are written in our scientific journals, our monuments are the industries which we build, which without our magic touch would never be."

After the war, reflecting on his former participation, Urey expressed "regret, with all my soul, but no guilt." When Bohr saw the uranium megamachine that America had built, he recalled his prophecy of the whole country as a factory and said, "You have done just that."

"It is a new century, and what we used to call electricity is its God," Henry Adams wrote home from the 1900 Universal Exposition in Paris. "I go down to the Champ de Mars and sit by the hour over the great dynamos, watching them run as noiselessly and as smoothly as the planets, and asking them, with infinite courtesy, where in Hell they are going."

Later, he recalled the x-ray and radium displays: "The nearest approach to the revolution of 1900 was that of 310, when Constantine set up the Cross. The rays . . . were occult, supersensual, irrational . . . a revelation of mysterious energy like that of the Cross; they were what, in terms of mediaeval science, were called immediate modes of the divine substance."

Adams felt the forty-foot dynamos "as a moral force," as "symbols of ultimate energy" and of "infinity." He spoke of "the reversible process" of "translating rays into faith," of "Power leaped from every atom." Then, as well, of the universe "running to waste at every pore of matter."

"The charm of the show, to me," he wrote, "is that no one pretends to understand even in a remote degree, what these weird things are that they call electricity, Roentgen rays, and what not. The exhibitors are dead dumped into infinity on a fork."

"This was the U.S. Government, and this was going to be real right," one retiree at Piketon told me about the start-up days. "We were going to make those A-Bombs out there! And going to make good money!"

Forecasting problems plagued the builders of the cascades. How would such an enormous stream of molecules behave as an integral whole? Would tidal forces take over? Would wild surges bring the Cascade to cataclysm? Could a chain reaction start in a mass that was humongous but spread out?

Paranoia over these possibilities beset the scientists and engineers, at a disadvantage against the unified hex colony because secrecy barred sharing information even among themselves. Einstein was asked about one vexing gas-migration issue, but when he asked too many questions about its application, the request for assistance was withdrawn. Disaster was narrowly averted at Oak Ridge when a visiting scientist from Los Alamos finally told them, against regulations, how much uranium would constitute a critical mass.

The compensatory tendency was to fetishize *control*. A molecular flock of such aggregate power never could be completely tamed, but boundary conditions could be monitored and manipulated. Just so, the diffusion plants boasted the first modern "control rooms." Each plant claimed eleven miles of instrument panels, with ten thousand gauges and switches per mile.

In twentieth-century fashion, the sequestered control room actually symbolized the loss of human control, for the main process could be remotely gauged but was too complex for manual operation and too dangerous for direct observation. Human isolation indicated mutual metabolic intolerance between person and plant, and this was actually

considered advantageous, for it meant the near elimination of human labor from the factory floor—a supervisor for every worker. The gaseous diffusion plant trumpeted a new kind of alienation with its automation: the separation of workers from one another, under remote surveillance, within a vast expanse of machinery and empty space. Workers first used bicycles to traverse the forbidding inner distances, freewheeling on Goodyear wingfoot tires. Of the many causes for complaint at the A-Plant, the most poignant was loneliness.

Inside the Cascade at Piketon, the process gas had to flow constantly, heated to more than two hundred degrees, or it would begin to coagulate, fouling the machinery, arresting the stream, and raising the possibility of a critical mass of uranium forming like a thrombus in its veins. The process buildings themselves were so hot inside that workers ventured from protective stations only for short stints of necessary labor. Ovens the size of small houses were used to heat the fourteen-ton cylinders of crystalline hex for entry to the Cascade. During slack time, a disaffected worker might fire up a cylinder oven to heat one can of chicken noodle soup.

The passing of the passenger pigeon in a cascade of folly, brutality, and denial that stands as the exemplar of extinction made by man is, on the one hand, an episode in discretionary history: a causal chain of casual choices that seemingly could have been broken by any minimally decent decision at any marginally opportune time.

On the other hand, it's an exercise in predestination—in the grinding on of what Cocteau called "The Infernal Machine." Below some critical mass, the flocks could not reproduce, and whatever the magic numbers of density the population were, they became unsustainable with a tilt in boundary conditions. When the forest expanse of beech and hemlock and sycamore gave way to defended fields of corn and tobacco, the fix was in—a catastrophe itself bound up with those vast historical complexes that we call the American and Industrial and Agricultural Revolutions. And so we might follow backward, arbitrarily far, the infernal workings of the machinery of fate, until we'd say that the passenger pigeon was damned or (the same thing) doomed before the first bird ever flew.

It is an irredeemable loss, the final cost of which cannot yet be accounted. The fall of the passenger pigeon set off a still- and ever-branching domino decline of species that had depended, in one way or another, on the multifold ecosystem of the serpentine flocks.

Yet in this mass passing there is the redemptive potential of a clearing. Ecologists see the stunning and shifting variety of North American birds as nothing but a vital efflorescence attendant upon the downfall of the wild dove's dominion. In the avian play and rivalry that unfolds in every yard and field and forest on the continent, we witness the continuing celebration of the end of the reign of the passenger pigeon.

Life is diffusion, a communion of triggers and filters, a continuous process of disconsolate particles across cruel barriers of selection and exclusion, resistance of membrane against movement of energetic flow, stone against stream, *cascade.*

Even as a boy, Harold Urey was easily distracted by any passing bird or train of thought. He would never lose his boyish appearance and attitude, impetuously following streams of ideas across fields of science, always arriving at some turning point of insight. Triggers and filters and feedback loops, automated and iterated in diffusion cascades, led Urey back to his young love of zoology and to his own cascade of diverse discoveries.

Only two years after leaving the bomb project, Urey one day found himself on the beach, fumbling with pieces of seashell in the sand, perhaps contemplating the contrast between open sky and the underground lab he had left at Columbia. Then the shells caught his attention; they were very nearly like fired kaolin clay. Since ocean animals breathe through their shells, he mused, perhaps the shells act like clay diffusion barriers, enriching the oxygen being drawn through from ocean water. What's more, enrichment should happen in direct proportion to the temperature, just as in a uranium cascade.

Now this really got interesting. During warmer times, more of the light isotope, Oxygen-16, should diffuse into the shell; during colder times, relatively more O-18 should pass and incorporate; and the ratio should become fixed as soon as the pumping gills of the inhabitant shut down. Urey proposed a brash theory to the world: oxygen ratios in ancient seashell layers should yield a record of changing ocean temperatures. This was the Manhattan Project metaphor in reverse. Any living creature that breathes though a porous exoskeleton is, in essence, a little gaseous diffusion plant.

The theory proved correct, and it had profound implications. It revealed the procession and recession of ice ages, enabled the correlation of climatic and organic evolution, and sparked thinking about how gases in the oceans and the atmosphere affect and are affected by global temperature over time.

While his wife, Frieda, devoted herself to anti-nuclear activism, Harold Urey studied life in radiant flux, alpha and omega. With a graduate student named Stanley Miller, he produced amino acids and other organic compounds from primordial soup, sparked by electricity. His knowledge of particle behavior led him to theorize the gaseous origin of planets and establish the fields of paleoclimatology and cosmochemistry. And it was Urey, that scattered and irascible country boy, who warned us about global warming and nuclear winter, about catastrophes of ever-diffusing consequence that can be triggered by a single choice.

Cascade maintenance mechanic M. J. "Bud" Galloway, Goodyear Atomic Employee No. 00013, died suddenly in his living room, halfway through the winter of 1997, following massive coronary arrest. His eyes glazed over that day, and the dog started to stare at him, so his wife and son

"laid him out on the floor and went to work." Wanda told me, "He was just gone."

I had asked Bud once what the ancient Indians, the Mound Builders, would think if they could take a look at the A-Plant. "We do a lot of amazin' things here," he said. "I don't reckon they'd know *what* to make of it."

Then I asked what *ought* to be made of it.

"My wife, she never knows what I'm a-doin' half the time. I watch what I say. But as fer where the uranium goes, all of ours, it's just fer reactors only. There's other plants that go much higher-assay than ours."

At least on some level, Bud knew that statement to be precisely wrong, because he often had to work in the X-326 building, the upper end of the Cascade, the highest-assay enrichment facility in the United States.

According to code, every atomic reservation in the country was designated by a letter and every building by a number. The Piketon site was marked "X," and X-326 was the process building that Bud and I looked down upon when we walked the ridgeline of his farm. The whole cascade at Piketon was built for the sake of X-326 after a planned high-assay section at Oak Ridge was cancelled to cut costs during the war. The interior of the building resembled a funhouse, with the scale of everything shrinking as you moved toward the last cell at the southwest corner, where bomb-grade uranium was drawn off to make fission triggers for thermonuclear bombs.

The scale reduction prevented criticality, but that was hardly the only hazard. The complications of fissile uranium caused leaks and breakdowns all the time. By the laws of diffusion, all lighter molecules within the Cascade tended to migrate toward its endpoint, so X-326 was the destination for most contaminants. To rid these there were "purge cascades," with traps for solids and vents for errant gases, released to the air at night, often with radiation alarms turned off. Recycled uranium (from salvage) and reprocessed uranium (from spent fuel) were fed directly into the building, introducing plutonium and technetium—two far more dangerous elements. Despite the obvious problems, it took years of public protest by the union to get X-326 designated a "red job area."

Bud was involved in all this, but, then again, he wasn't. Around the A-Plant he would visibly dissociate, shifting his eyes. His chin would disappear, his chest sink, and his head bob as he thought what he could and couldn't say. Wanda can't remember Bud's talking about his official occupation of more than thirty years. But with his Stone Age artifacts, he always looked at me directly and breathed; his chest would expand, his shoulders would drop as if wielding a tool, and his jaw would jut in self-confidence.

Bud and I were friends, and I understood that when he misled me about the end use of the uranium, it was out of neither ignorance nor an intention to deceive. It was simply detachment of the twentieth-century kind. Separation: that was the *tangible* product at the A-Plant. When workers did come into contact with uranium, it was as a corrosive cloud or residue

from accidental release. At such times, the general instruction was: Run.

"Yer main work out there," Bud said, "is production of uranium, so that's what yer gonna be contendin' with. It's like foolin' with a poisonous snake. You may not be really afraid, but you want to learn to respect it and stay yer distance. Contamination is like electricity. You don't know how much is there unless you've got a meter to it. So you have to respect every bit of it."

"Machine-living," that distinctly American mode of production for the twentieth century, sprouted from the nineteenth-century mode of destruction for the American wild dove. Setting the modern standard for efficiency and economy of scale, two men, representing the new class of market hunters, reported catching between fifty thousand and sixty thousand pigeons in two days, only two decades before the complete disappearance of the species from the wild.

Live passenger pigeons became standard targets for shooting practice, giving rise to the connotation of a pigeon as a mark. "Find, Trap, and Handle" matches provided an early form of mass entertainment. When the birds became scarce, a "new invention" was patented in Cincinnati "to fill the void"—machine-hurled ceramic discs glazed nickel-gray for simulation—*clay pigeons*. Ceramics thus was brought full circle from its invention for the production of fertility figurines—clay idols of the goddess accompanied by her doves.

Passenger pigeon became America's first fast food, in nearly every sense, uniting the nation through mass distribution and marketing. Dead pigeons by the trainload were supplied to Eastern outlets and eateries, so the birds could be roasted or pickled, baked into pigeon pot pies with florets of feet sprouting up through the crust, or garnished with sprigs of myrtle in their bills—a fetching dinner-table reminder of God's covenant with man.

Carcasses sold for a penny apiece or less—*a dime a dozen*—while the supply lasted, and often they were chopped up for hog feed or fertilizer, or they were left to rot.

So what had the wild dove done to deserve its obliteration?

Imagine you're making your home on the range when you look afar for the dawn's early light and you see, instead, a *billion* pigeons, bawdily dropping on your American dream. Brooding flocks would inundate and ruin a township at a time, masticating whole forests, crushing arbors, and downing telegraph wires with the plumb of bodies, nests, and dung.

Native Americans revered the guano rains, for the mounds of wild-dove manure nourished fields of herbal elixirs like ginseng and pokeweed. The passenger pigeon was sacred steward over migrations of the tribes, a portent of the coincident disappearance of the tribes and the flocks. "They naturally called it a wild pigeon, as they called us wild men," wrote Chief Pokagon. "If the Great Spirit could have created a more elegant bird in

plumage, form, and movement, He never did."

To the new American mind, the passenger pigeon was threatening not just because the birds assaulted agriculture and telegraphy but because they assaulted the image of the American interior. Nature, outer and inner, should be the base and bastion of liberty, free space for the atomic individual offset from the madding crowd. In the dense forest sprawl of the Ohio Valley, however, the found reality was a dizzying cosmopolis of pigeons and native civilizations, in a shocking way *urbane*. This nature not only made an inhospitable refuge but was also demonstrably social at its core, and that cast a similar doubt on the American psyche's independence from society.

In other words, the new Americans found organic communalism at once endearing and annoying. A stunning integration of organization and energy, "each part reliant on the whole and incapable of being distinguished," the wild dove in spirit affronted the spirit of the wild frontier. James Fenimore Cooper praised the order of the doves in family clusters but then complained that, *en masse*, "Chaos itself could hardly have represented greater confusion, or a greater uproar." When the westward migrations of Columbian man met the main mass of *Columba migratoria*, it was a clash of civilizations as well as of species, even of ideologies or of religions, for pigeon and pioneer subscribed to different philosophies of individualism and freedom.

And yet there were disturbing resonances. The doves expressed their wild liberty through complete conformity, as if to parody and provoke the new American creed. The shimmering silver pigeon flock became a flying mirror for emergent mass society, and as the anomie of city life spread by technological extension to the hinterlands, it became the goal of every gunshot by a boy to shatter that mirror—a rite of passage, so to speak.

As Rutherford and Soddy recorded the perfect parabolic curves of species vanishing a half-life at a time, they quickly realized that indeterminacy at atom scale made for predictability for radiant matter *en masse*. Individuality was surrendered to conformity in flock. To Rutherford, this was the statistical dynamic of the steam engine. To Soddy, it was the random variation underlying the selectivity of intelligence and evolution.

The Radiant Atom is changing in its essence, but its propensity to disintegrate does not itself change with time. Impervious to external influence, the atom endures at a constant point of indecision, its equanimity fixed by species. Then, at some irascible instant, an intersection of determination and caprice, BLAM!, the unthinkable happens: integrity is shot to hell; tectonic plates on the atom tilt; it perishes, then is reborn.

The available analogy as the twentieth century began was to the sentient mind, whose sense of the present is ever-refreshed by the flow of living experience. We are changing in our essence, but we endure at a constant mo-

ment of felt freedom, its self-confidence fixed by what then was called our species-life.

For this reason, Soddy portrayed the Radiant Atom as a sentient living entity totally unlike Rutherford's ghost in the machine. The Soddy Atom is not only capable of change; it experiences the life of a historical organism. It is born through cosmic processes, endures through Bergsonian time, then passes away in radiant transfiguration. It is neither solid matter nor empty space but protoplasmic, a wellspring of vital energy regulated from its nucleus, like a cell. Nor is his atom ethically neutral, for it contains within its metabolism a conjunction of self-creation and self-destruction, omnipotent for beneficence and evil.

Ernest Rutherford saw spontaneous disintegration as an aberration from the norm of atomic stability, a symptom of excess on the part of the heaviest elements. But to Frederick Soddy, stability was an illusion, a false front that conceals a storm at the core of every atom. Soddy thus predicted the possibility of artificial transmutation with labor-saving work accomplished through the liberation of atomic energy. And before the First World War, he imagined the design of an atomic bomb.

He warned of the dangers of both—the former might lead to general decadence, the latter to universal destruction. Such forebodings were way before their time, however, out of any context in the first decades of the twentieth century. They called him "Oddy Soddy," and even Lord Rutherford, who built his reputation upon his colleague's discoveries, came to dismiss him as something of a loon.

The original choice of gaseous diffusion by Vannevar Bush and a policy committee of the War Department turned out to be more fateful than even Harold Urey could have imagined. In the United States, three cascades were built in planned proximity between Ohio and Tennessee, leaving good greenbacks right among the most needy of people. The new atomic towns resembled nothing so much as outposts of the Soviet Union—more totalizing versions of the company towns from industrial eras past.

The Piketon A-Plant put scores of families on their feet—becoming the region's only significant source of employment outside the huge state prison in Lucasville. Plant management exercised total control over security clearances—stamps of state approval based on rated levels of compliance—that gave many their only access to a paycheck. Roads and telephone lines, built by the federal government to coordinate its atomic towns, were assumed to be monitored at all times. It was no secret that stool pigeons were installed throughout the region.

The Soviets themselves opted first for diffusion, to counter any secret advantage that the Americans might gain through their apparent illogic. Erecting the uranium megamachine in the Soviet Union took a tremendous toll in life and freedom. A Columbia-type pilot cascade rose in a

wooded marsh east of Moscow, at a German-style prison camp called Elektrostal (Electro-Steel); then four mass-production models went up in the Ural Mountains. All were built Babel-fashion, the first by 18,000 Soviet soldiers repatriated from German POW camps who were quickly marked as "contaminated"—the same word used for the impurities that had to be purged from uranium ore. Housed at one gigantic gulag, they were segregated into groups according to which army had "liberated" them, the worst work going to those unlucky souls freed by the Americans. One said he "had passed through all the circles of fascist hell."

Incapable of realizing private-sector benefits, the Soviets came to see their cascades as big agglomerations of lots of little social sinkholes. They abandoned the technology, but not before transferring it to China, which proceeded to build an atomic gulag system of its own.

Four decades of bilateral commitment to gaseous diffusion locked the superpowers into the continual production of profligate quantities of enriched uranium, a commodity for which there was no preexisting demand. Artificial markets, both military and civilian, had to be created and subsidized in consequence, and this was the impetus for the sad worldwide adventure of civilian nuclear power, along with such half-witted schemes as the atomic-powered atomic bomber and the nuclear-powered rocket to Mars (neither of which ever flew). Most unfortunate were the rationalizations for massive overkill capacity in stockpiles of nuclear weapons. All along, the real strategic justification was to keep the uranium factories and their infrastructure going, exactly as Urey had warned. Once you flip the switch on a diffusion cascade, you just can't turn the damned thing off.

As living creatures, the plants made demands for habitat little different from those of the behemoths of the Paleolithic Age. In the vast interior spaces of Russia, China, and America, locales were sought at the old stomping grounds of the mastodon—places, like Piketon, with prodigious supplies of fresh water and circles of low-lying hills for a sense of security against predation. For enrichment plants, hills afforded a façade of shielding from espionage and a feeling of protection against ground assault, at sites far enough from external borders to be safe from bomber attack.

"Security" had to be understood in psychological terms, and in this there were no national differences. After expensive antiaircraft artillery was installed at Piketon in the mid-1980s, management conducted an evacuation drill by setting off alarms while spreading the false rumor that "antinuclear subversives" were threatening to fly a plane into the Cascade. The disinformation was never acknowledged. (How guns at the plant would be of any use against a kamikaze attack was also never clarified.) When a real hijacker had threatened to fly a plane into the Oak Ridge cascade a decade earlier, the federal official in charge broke down in panic and left his assistant to negotiate with the man (whose opinions about atomic energy remain unknown), and workers were neither evacuated nor told.

Because of the tremendous cost and burden and pregnability of these facilities, it was a shared cold-war assumption that uranium enrichment would remain an oligopoly of the largest powers; no upstart country would dare invest in such a thing, because it could be seen and easily destroyed. Of the vulnerable European powers, only the French pretended they were big enough to supply and defend a diffusion cascade.

Thus gaseous diffusion was trumpeted as proliferation-proof, and this false logic undergirded the nonproliferation regime, which has now spectacularly failed. No one seems to have anticipated the obvious: aspiring nuclear nations try for gaseous diffusion, quickly realize that it's a pound-foolish project, then form a nuclear club of their own, a club of successor states that exploit cascade technology to make other enrichment methods more facile, a club that specifically excludes the United States. Ultimately, the hills around the A-Plants provided no more real security for atomic technology than they had for the mastodon—or the last wild passenger pigeon.

Two dozen passenger pigeons, more or less, survived for a time in captivity; but for want of freedom and a flock and a fighting chance, they dropped unfertile, one by one. The last, a female named Martha by her keepers, died in Cincinnati at the end of summer in 1914. That event augured the outbreak of the First World War, and in that same year the wild pigeons of Europe were reported to have disappeared along the war's Russian front. Some naturalists said they succumbed to phosgene gas; some said the doves were displaced by scavenger birds feasting on the carnage.

Ishi, the lone survivor of a massacred Indian tribe who had stumbled out of the woods into twentieth-century civilization, caught a terminal case of tuberculosis from his keepers in 1914: another sign of the times. H. G. Wells had just published a dark parody of war called *A World Set Free,* based on an encounter with Frederick Soddy. The novel depicted the earth set ablaze and poisoned by small "earth-penetrating" atomic bombs dropped from biplanes by hand. The "continuing explosives" would leave the bomb-fields "sprinkled with radiant matter" and "inconvenient rays." This, according to Wells's unfanciful projection, "would give the 'decisive touch' to war."

The idea that such weapons would "set the world free," meant as mockery by Wells, would be adopted in seriousness by Vannevar Bush. He proceeded to define the cold war as a struggle of "free society"—"the timeless setting of the individual"—against the "synthetic communal objectives" of the Soviets and fellow travelers, who drew inspiration from "tightly knit, highly integrated communities" in nature. By this, he meant to threaten that the communists were headed down that same dead end against American weaponry already traveled by the passenger pigeon. Bush titled his memoir of the Manhattan Project *Modern Arms and Free Men.*

To the extent that American freedom had its root in the wild nature of the frontier—a tenet that everyone accepted in one form or another—the

clearest representation of that freedom disappeared for good in the spring of 1900. Perhaps for this reason most of all, acknowledgment of the passenger pigeon's extinction did not come easily to Americans.

Hunters, eager to escape blame, argued that the birds must still exist. Conservationists argued that any official declaration of nonexistence would warrant against budding efforts at protection. Religious men argued that only God could declare an extinction, not the government, and this reflected a widespread conviction that mortal men couldn't possibly expunge a whole category of everlasting divine creation.

All these sensibilities seemed to dovetail in the only sighting in the wild given any credence after 1900, one by President Theodore Roosevelt. On retreat in rustic Virginia in 1907, he reported seeing a dozen passenger pigeons "flying to and fro," and even said that they returned for an encore performance. This was widely believed, and biographers have credited the claim as genuine. But experts paid no heed: Roosevelt's vision was so poor that he made most "sightings" by sound alone, and his heroic account of the birds carelessly implied that all were male, with coloring identical to one specimen he himself had shot and mounted as a boy.

Why did the president of the United States feel obliged to keep the passenger pigeon alive? To build a system of national parks and wildlife refuges, Roosevelt needed evidence that something feral and free was left in America to preserve. Just then the realization struck that no passenger pigeon had been seen in the wild for seven years. Unless the souls of the last captive survivors really did parade in free congregation at the president's camp, we have to say that his state of the pigeon message trumpeted phony intelligence, trumped up by TR himself so as not to let symbolic freedom die.

Searches to find a feral breeding pair of passenger pigeons were undertaken, and continued well into the century, until human events made clear the concepts of irreversible loss and exhaustible hope. The American wild dove was gone, and with it forever the arc of its vibrant colors and movements, the hum of its procreant flocks, the special stench of its verdant fecal mounds. There was no grace or sense or use in it. The passenger pigeon, as Henry Adams would have put it, was dead dumped into infinity on a fork.

By the early 1980s the glut of enriched uranium caused its price to plummet, and what remained of a market was seized by foreign competitors using new enrichment technologies. Half a billion dollars had just gone to upgrade the A-Plant's capacity, but such investments had become little more than aid packages to contractors and the Appalachian region. Unable to justify more huge amounts of money and power down trillions of tiny diffusion drains, federal officials planned to shut the A-Plant. However, they forgot to tell the people in Piketon.

That task fell to me as a labor consultant. I notified the unions of the government's impending decision, and I published an op-ed piece called "Life After Gaseous Diffusion" in all three enrichment communities. I might as well have said in the spring of 1900 that the pigeon flocks would not come back.

Save-the-A-Plant committees sprouted at every level from elementary school to state government. Half-hearted rallies called in double-loud tones for instant repeal of the laws of nature and economics. Missions and missives were sent off to Washington, arguing that each isotope-separation plant was all that stood between us and communalist subversion. (And oh, by the way, the government should guarantee A-plant paychecks in perpetuity.) Ohio and Kentucky rose to strategic alliance and lobbied for closure of the Oak Ridge A-plant first, ensuring their own last share of the vanishing business. With the idea that killing the messenger might alter the message, threats were made against my life and health.

Then a funny thing happened. The cold war ended. With the tilt toward peace and a flood of cheap reactor fuel from new Russian centrifuges, the diffusion dole in America should have been short-lived. But the last Soviet diffusion plant had closed, creating a problem. High-assay Russian uranium had to be shipped to Piketon for "downblending," a process by which the Cascade was essentially run in reverse, using the pipes of X-326 as mixing tubes to unenrich the stuff to below bomb-grade. Then, when Congress tried to privatize the enrichment business, a cartel of Russian nuclear and defense firms formed to place a bid. They called themselves the Pleiades Group, named for the seven sisters who symbolize hope and renewal, represented as a cluster of doves. With ex-Soviet free marketeers bidding to buy the critical link in America's nuclear-fuel chain, the deal collapsed. But Piketonians made their living for a few years by unmaking old Soviet uranium, an odd kind of peace conversion that wreaked local havoc on the ideology of atomic progress.

With the Russian work done, gaseous diffusion at Piketon is again a goner. During the first spring of the twenty-first century, the Cascade was placed in "cold sleep" status. "Sampling, measurement, and calculation" continue in support of the remaining diffusion plant in Paducah, Kentucky. Most workers have been laid off, left to seek health care and compensation through litigation and legislation. The Southern Ohio Diversification Initiative now seeks new uses for the infrastructure of the site.

But life after gaseous diffusion comes half-measure. Piketon and Paducah now compete for a new centrifuge plant that might concentrate all American uranium enrichment at one site. To influence the decision, the Cascade is maintained in suspended animation, so as not to let symbolic separation die. In the fall of 2003, I asked Wanda Galloway, Bud's widow, what she thought of the A-Plant's closing down. "I don't think it ever will," she told me. "I think it will keep a-goin' forever."

Activity at the reservation will not cease for a long time to come, in any case. The carcass of the Cascade must be salvaged, gutted, and entombed. As at other gaseous diffusion sites, the process buildings will metamorphose into a surreal industrial mining operation. Its goal will be the reclamation of all that nickel, copper, silver, and gold from the matrix of chemical and radiological toxins in which the metals have become enmeshed. Much of what is reclaimed will be used to mint new coinage, all too literally putting a bit of the Manhattan Project back into the pockets of taxpayers.

Pocket change, however, will not begin to pay for even the most urgent environmental protection, including action to stem the flow of underground plumes of uranium, fluorides, and solvents that now threaten to migrate off the reservation. For all three diffusion sites in the United States, these costs are estimated at between twenty and thirty billion dollars. To put this in perspective, that is two and a half *trillion* times the price of one passenger pigeon, more or less.

At the point of spontaneous disintegration—radiant release—structure collapses to energy, indecision to certainty, endurance to the deadline of time. Present tense—the ever-involuting knot of felt freedom where roots of cause tangle into branches of consequence—collapses to history, routine collapses to laughter, possibility to fate. Then fate collapses in its turn.

To get a true sense of this place, this valley, this passage at the middle of middle America, I would go up to the hills overlooking the A-Plant and sit by the hour over its great dynamos, watching them run and asking them, with infinite courtesy, where in Hell they were going.

Here in the land of the feral and indigenous atom, where nuclides breed protected and isotopes cascade free, I have felt the incessant machine grind of rotation and revolution, of embedded cycling that beats boredom into thrill, of convulsing conclusion that mulches thrill into nausea.

It's a field of battle, a place of savagery and of silence—of silence deepened, for a time, by the constant far-diffusing hum of the A-Plant, with its two thousand forty-foot motors at three thousand horsepower apiece. A fertile place, made more so by the scattered scores of passenger pigeons.

A place where, at any moment, with one touch of the finger still, *you* might go extinct. But where, with the Cascade laid to rest, the air, unmodern and unelectrified, is sweet again with self-confidence.

The Galloway farm straddles the ridge at the southwest corner of the Piketon Atomic Reservation. From there, you get a fine view of the flood plain of the Scioto River and the creeks that run down to it, from the tomb of the INCO nickel plant, past the wrecks of worksheds and mills.

I went to visit Bud one day because some old maps told me that Sargents had once been a town of its own nearby, demolished in 1952 to make room for the A-Plant. It was the anniversary of the shooting, and I wanted to ask

Bud for some clue to the site of the old Sargents Grain Mill.

Bud, small and gray, wearing baggy pants and a feed cap and looking like a refugee from a Norman Rockwell painting, met me out at the head of his long dirt driveway. He told me that he didn't know "much a-nothin' about no pigeon," only that he had "heard tell a-one once seen hereabout." We walked to the barn, looked at some recent finds, then wandered back to the spot where we had started. When I asked about the mill, he smiled.

"If yer a-lookin' fer the *Sargents Grain Mill*," said Bud, "then you sure not better look far off. It's right where you already are," he said. "Yer a-standin' on it!" And then he was halfway chuckling: "I tore that ol' thing down myself when I bought me this here farm!"

Bud pointed to a patch of ground not ten feet from where we were standing, to a spot near a small Roman-style pedestal that displayed his prize piece—an enormous, pointed, menacing rock, in the distinct shape of a spear point, that must have weighed fifty pounds. It had a deep cleavage on the blunt end, where a rope could be tied. Ten thousand years ago, this rock would be suspended over a large pit. A mastodon would be tricked or chased into the trap and then, with just one touch, BLAM!, this missile would fly down into the creature's giant loins.

The Kill-Stone, as Bud called it, was the megaton warhead of the ancient arsenal. It is now established that the mastodon was hunted to extinction, and one touch of that Kill-Stone made my augur's nerve twitch.

So I asked Bud Galloway how he felt about all this. About the unreturning mastodon and the unreturning dove. About the unreturning ancient Indians, whose tools and vessels he collected, and about the modern weapons of extinction, which for thirty years he helped produce.

"They said the wildcat was eggstink," Bud told me, "but I seen one right yonder." He pointed up a creek bed to the top of the ridge, toward the site of a spring, and of many successive ancient encampments, and of, as it happened, the A-Plant. "They said the coyote was gone, but I seen one a-them right yonder, too. I don't figger we're like that pigeon, or like them Indians. I figger we're more like the wildcat or the coyote. I figger we got it in us to come back. We got a lotta *life* left in us."

The story of the Sargents Pigeon is compelling for many reasons, not least because it tells of the only specifiable endpoint to a species in the wild. We have the time and place, the *corpus delicti*, the *modus operandi*, and the assassin. A man named Press Clay Southworth, who had lived on a hill farm near the grain mill, left behind a letter of confession when he died in 1980, at age 94. He took his "trophy" using a 12-gauge shotgun "with one shell."

But that's not the end of the story. Blanche Barnes, who mounted the pigeon in 1900, when she was only twenty-three, was also six months pregnant at the time. Both she and her first-born, a son named Isaac, died soon

after delivery in June. A likely cause was arsenic poisoning from her taxidermy. The graves of Isaac Barnes and his parents cluster small against the backdrop of a large Adena mound in Mound Cemetery, up the road from the family's former habitation.

Is there a Curse of the Sargents Pigeon? If so, it must be a hex on all of us. But I think I know how it can be dispelled.

The Galloway farm and the old Barnes home stand like gateposts on Wakefield Mound Road, at the main entrance to the A-Plant. Both should be marked as memorials, or they should mark the threshold to a much larger one. Only a mile away, as the pigeon flew, is the endpoint of the Cascade. This was the portal, the venomous tip of the fang of the Great Serpent, where high-assay uranium was harvested for hydrogen bombs. A different but not so different *scène du crime*. Another final station. Place and history being shifty by nature, we might say X-326 marks the spot.

At the Piketon Atomic Reservation, amid ongoing environmental restoration, we should establish a national monument. The entombment of X-326, set to start in 2004, should include an open sarcophagus for the Sargents Pigeon, as representative of her race and all those gone or going by artificial means. The last gaseous diffusion cell, the end of the line, should be her *sanctum sanctorum*, her portal to immortality, where she can find a permanent perch on a ladder to no place, made of solid gold. The outer structure, the husk of X-326, covers almost three times the acreage of the Great Pyramid at Giza. And isn't that appropriate, too?

Hieroglyphs on the eighty-foot-high chamber walls should depict beech forests giving way to cornfields, to keep the doves fed in their afterlife, and as an unmistakable sign for civilizations yet to come.

There must be a plaque, of course, in porous and impervious nickel, forged from diffusion barriers. A signal vermilion eye should stare from its center, as nearly unsettling as were the living eyes of the passenger pigeon. Outpacing time, it should stare forever, or for however long. Stare out. *At us.*

The inscription should include the same quotation from the Book of Job that was set in stone in 1896 over the entrance to the Natural Sciences building at Columbia, the entrance that became the portal to the diffusion laboratory of the Manhattan Project. As epitaph for the Sargents Pigeon, and for the industries of extinction that without our magic touch would never be, let us engrave the passage in fuller form:

ASK NOW THE BEASTS, AND THEY SHALL INSTRUCT THEE;
AND THE BIRDS OF THE HEAVENS, AND THEY SHALL INFORM THEE:
OR SPEAK TO THE EARTH AND IT SHALL TEACH THEE.

EXHIBIT D

Ohio Historical Center

1982 Velma Avenue
Columbus, Ohio 43211-2497
614/297-2300
Fax: 297-2411
www.ohiohistory.org

OHIO HISTORICAL SOCIETY
SINCE 1885

Barb Powers
Ohio Historic Preservation Office
567 East Hudson Street
Columbus, Ohio 43211-1030

Dear Ms. Powers:

This letter is in reference to an application for the Historic Register by Geoffrey Sea for a property known as the Barnes House.

Mrs. Clay Barnes, also known as Mrs. Henry C. Barnes is recognized as the taxidermist who mounted the Sargent's Passenger Pigeon. This bird has been referred to as the last wild, documented passenger pigeon. Authoritative references include:

Henninger, Rev. W. F. 1902. A preliminary list of the birds of middle southern Ohio. Wilson Bulletin IX (3): 81-83

Schorger, A. W. 1955. *The Passenger Pigeon: Its Natural History and Extinction*. University of Wisconsin Press.

Cokinos, Christopher. 2000. *Hope is the Thing with Feathers*. Tarcher/Putnam Books, New York. 359 p.

Documents report the bird was shot in or near Sargents, Pike County, Ohio in March of 1900 by a fourteen-year-old boy, Press Clay Southworth. The same sources report that he took the bird to the wife of the former sheriff, Mr. Barnes, who was an amateur taxidermist. While the exact location of where the bird was shot is somewhat debated, it was near the Barnes home.

The bird is now part of the natural history collections of the Ohio Historical Society, being catalog # N 12270. Mr. H. C. Barnes of Sargents, Ohio donated it on February 27, 1915, following correspondence with William C. Mills. This correspondence is in the OHS Society Archives and further records of the bird are held by the OHS Registrar's office and in files with the natural history collections.

This bird is currently displayed along with other extinct animals in the Nature of Ohio exhibition and is an important part of that exhibit. Its presence on exhibit, and its perpetual preservation in our collections is highly significant as it documents the importance of Ohio in this extinct animal's range. Further, it helps to explain the phenomenal changes caused by human actions that brought this species from populations of billions of bird to zero within a single century. We are grateful that the specimen has been preserved, and for the role that Mr. and Mrs. Barnes played in that preservation.

Sincerely;

Robert C Glotzhober

Robert C. Glotzhober
Curator, Natural History

CC/ Geoffrey Sea

EXHIBIT E

Audubon OHIO

692 North High Street, Suite 303
Columbus, OH 43215-1585
Tel: 614-224-3303
Fax: 614-224-3305
www.audubon.org

February 24, 2005

To: Commissioners, Secretary and Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission, and Whom It May Concern

Dear Friends:

I am the Executive Director of Audubon Ohio, a conservation and wildlife advocacy organization with over 14,000 members throughout the state, some of whom live in and around Pike County, Ohio. We currently have 18 past and present donors living in Piketon itself.

Audubon Ohio is the Ohio office of the National Audubon Society, a 100-year-old conservation organization with over 400,000 members nationwide. Our mission is to conserve and restore ecosystems, focusing on birds, other wildlife and their habitats, for the benefit of mankind and the Earth's biological diversity. Geoffrey Sea is one of our members.

In pursuit of our mission, Audubon Ohio and the National Audubon Society believe it is important to protect, preserve and commemorate sites that have a special place in the history of conservation and ecology. Two such sites are in Pike County, where the last passenger pigeon ever sighted in the wild was shot by Press Clay Southworth on March 22, 1900. Over the years, investigators have tried to locate the precise scene of the shooting, without success until Geoffrey Sea did find the former residence of the Southworths and the nearby Sargents Grain Mill along Wakefield Mound Road, approximately one mile south of the A-Plant southwest access road. An affiliated site is the Barnes Home at 1832 Wakefield Mound Road, where the bird was mounted and displayed between 1900 and 1915, when it was donated to the Ohio Historical Society. The specimen is now prominently displayed at the Historical Society's Museum in Columbus.

The extinction of the passenger pigeon, once the most populous bird in the world, over the course of a single century is generally regarded as the most important and most instructive of all extinctions made by man. That is one reason that preservation and commemoration of the Pike County sites are so crucial. The other reason is that this is the only place on earth where the slaying of the

last-seen wild survivor of a species has been located. The sites should be preserved so that they can be properly marked and made available for public education. At the scene of the last passenger pigeon shooting in Wisconsin, the great American ecologist, Aldo Leopold, erected a famous bronze statue. Pennsylvania also has its passenger pigeon memorial, erected by the Boy Scouts of America at Pigeon Hills. The proper place for a national memorial is in Pike County, Ohio, as proposed by Geoffrey Sea in his essay in *The American Scholar.*

John James Audubon himself was moved to conservation activism by his witness of pigeon hunts, and his description of them stands as one of the earliest and most compelling bits of ecological writing. Audubon described a raid on a nesting of passenger pigeons this way:

"The tyrant of the creation, man, interferes, disturbing the harmony of this peaceful scene. As the young birds grow up, their enemies, armed with axes, reach the spot, to seize and destroy all they can. The trees are felled, and made to fall in such a way that the cutting of one causes the overthrow of another, or shakes the neighbouring trees so much, that the young Pigeons, or squabs, as they are named, are violently hurried to the ground. In this manner also, immense quantities are destroyed." (John James Audubon, *Bird Biographies*, "The Passenger Pigeon.")

The proposed construction and operation of a uranium enrichment plant at the southwest corner of the Department of Energy reservation would impact these historic sites and potential future projects in a number of ways. The location of the new enrichment plant borders on the Barnes Home property, and some of the land was originally taken from the Barnes estate. Safety and environmental fears, along with the conspicuous security regime, if not crafted with sensitivity to the historic importance of the neighboring property, could certainly deter public visitation to and appreciation of the historic sites.

The National Historic Preservation Act provides mechanisms for averting and ameliorating such impact. Unfortunately, the Department of Energy has not complied with its obligation to implement the various provisions of the act, creating now a monumental challenge for how to bring the proposed project into accord with federal preservation law.

Audubon Ohio supports Geoffrey Sea's intervention in this case. There must be an advocate for preservation and ecological interests involved in the proceedings.

Sincerely,

Jerome C. Tinianow
Vice President and Ohio Executive Director

EXHIBIT F

Subj: **Intervention support**
Date: 2/24/2005 12:20:18 PM Eastern Standard Time
From: roger@rkennedy.net
To: GeoffreySeaNYC@aol.com

To the Commissioners, Secretary and Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission and to Whom it May Concern.

I am traveling away from home and letterhead, lecturing at Stanford University and for a group of private foundations in San Francisco However, I wish to use this electronic means to support the intervention of Geoffrey Sea in the USEC American Centrifuge Plant licensing action.

IMr. Sea is entirely correct as to the importance of the Barnes works to American history and to our living cultures. It is among the half-dozen most important pre-Columbian sites in the Ohio Valley, and when more work is done on it by competent archaeologists it may turn out to be among the half dozen most important in the United States. If the people of Louisiana can save Poverty Point, and the people of East St. Louis can save Cahokia, surely the more affluent people of Ohio can rally to protect their heritage from desecration. The balance is hardly even between a mere adjustment for convenience of an atomic energy plant which can go anywhere within a hundred mile radius, and a precious place with no equals, no counterparts, and no chance of replication. This generation would be disgraced if further damage were done to an inheritance from the ages. The Barnes site must be saved. For that to happen, it might be well for the site ultimately to be placed in responsible public hands, such as the National Park Service or the Ohio State Park System, or within the jurisdiction of the United States Forest Service.

I would be happy to verify the authenticity of this commendation by responding to an email sent the sending address.

Roger G. Kennedy
Director Emeritus, National Museum of American History
Former Director, the United States National Park Service

EXHIBIT G
1

ROGER G. KENNEDY

Former Director, the U.S. National Park Service; Director Emeritus, the National Museum of American History, Smithsonian Institution; Vice President, the Arts, and Vice President, Finance, the Ford Foundation; Vice President, Investments, the University of Minnesota; Chairman of the Executive Committee, the Northwestern National Bank of St. Paul; Special Assistant to (in sequence): the U.S, Attorney General, the U.S. Secretary of Health, Education, and Welfare, and the U.S. Secretary of Labor. Commissions and other assignments for six presidents.

Publications:

Books:
Minnesota Houses, Men on a Moving Frontier, American Churches, Greek Revival America; Architecture, Men, Women and Money; Orders from France; Rediscovering America; Mission; Hidden Cities; Burr, and Hamilton, and Jefferson: A Study in Character; Mr. Jefferson's Lost Cause. General Editor and Prefaces for each of the twelve volumes of The Smithsonian Guide to Historic America (12 vols.)

Articles:
Harpers, the Atlantic, Smithsonian, New York Times, Readers Digest, Architectural Digest, House and Garden, Winterthur Quarterly, Law and Contemporary Problems, Harvard Business Review, House Beautiful, American Heritage, Prairie School Review, NY Times, LA Times.

Prefaces and forwards:
A bi-lingual history of the U.S., WPA Guide to Washington, Treasures of the National Museum of American History; The Law and Lore of Portfolio Management, The Art of Clay, Public Uses of Archaeology, The French in America, Philip Hooker, Architect.

Television and Radio:
White House Correspondent for NBC, and appearances as correspondent for "Monitor," TODAY, etc. 26 half-hour documentaries for regional PBS. Presenter and writer of two series for Discovery Channel: "Roger Kennedy's Rediscovering America" and "The Smithsonian Presents Invention." Appearances on BBC (The Prize); PBS (Smithsonian series). Commentary for APR, Monitor Radio, Monitor TV.

Juror:
The Premium Imperiale (a decade or so); architectural design contests in Japan and the United States.
Financial adviser to: E.M. Warburg-Pincus(N.Y.),

Corporate Associations :
Lombard Odier et cie (Geneva). Director of: Lombard Odier International Portfolio Management, Inc. (London), Transatlantic Capital Corp (Boston), Mattel, Inc. (Los Angeles), Vestar, Inc. (San Dimas); Nexigen (Boulder), HNW (New York), HNW.com N.Y., Selden Industries, (Woodstock, Vt.), Northland Insurance Company, and Northwestern National Bank (St. Paul).
Foundations, etc. Advised many foundations, and universities on investment policy including Harvard, Yale, Princeton, and Stanford. Chairman of the Finance Committee of the Joseph P. Kennedy Foundation and the Edna McConnell Clark Foundation.

Lectures:
Colleges and Universities: Pennsylvania, Brown, Harvard, Yale, Amherst, U Mass, Princeton, Texas, Virginia, Boston, Stanford, UC Berkeley, UCLA, U. of Oklahoma, U. of Nebraska, Humphrey Institute, U. of Minn., North Carolina, Duke, Chicago, Columbia.
Museums: National Gallery of Art, the Metropolitan Museum, the Boston Museum of Fine Arts, the Chicago Museum of Fine Arts, Sam Noble Museum of Natural History (OK. City), the Morgan Library, the Philadelphia Atheneum, etc.; National Museum of American History

Awards: Honorary Member, American Institute of Architects; New York Film Critics Silver Medal; Various honorary degrees.

Education:
U.S. Navy, Yale (BA –1949). University of Minnesota Law School (LLD – 1952).
TELEPHONE: 617-491-7247 EMAIL:roger@rkennedy.net
ADDRESS: 33 Linnaean Street Cambridge, MA 02138

EXHIBIT H

UNIVERSITY OF Cincinnati

College of Design, Architecture, Art, and Planning
Office of the Dean
University of Cincinnati
PO Box 210016
Cincinnati OH 45221-0016
Phone (513) 556-4933 / Fax (513) 556-3288
Web http://www.daap.uc.edu

February 21, 2005

To: The Commissioners, Secretary and Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission, and Whomever it May Concern.

From: John E. Hancock, Professor of Architecture and Associate Dean
Project Director "EarthWorks: Virtual Explorations of the Ancient Ohio Valley"

Re: Support of the intervention of Geoffrey Sea in the USEC American Centrifuge Plant licensing action.

One of North America's richest prehistoric legacies lies mostly buried or destroyed, and nearly invisible, beneath the modern landscapes of southern Ohio. The first settlers in this region stood in awe, amidst ***the largest concentration of monumental earthen architecture in the world.*** These included effigies like the Great Serpent Mound, and hilltop enclosures like Fort Ancient; but the most spectacular were the many embankments and enclosures formed into ***huge, perfect, geometric figures.*** Two centuries of archaeological research have shown that these were created by an ancient Native culture (we call it "Hopewell") dating back as far as about 2000 years.

Apart from three of these figures at Newark, Ohio (two circles and an octagon), no others exist in complete, visible form, though several survive in ways still useful to archaeological research. The circle-and-square at Piketon, also known as the Barnes Works or the Seal Earthworks, despite its scant remains, is significant for several reasons:

- it is among the least known or investigated to date by archaeologists;

- its double-figure shape links it to two of the most culturally-revealing earthworks that have been investigated (at Newark and High Bank), suggesting similarly-precise astronomical functions akin to those at Stonehenge;

- it is at the center of the thickest concentration of these works, between Portsmouth and Chillicothe, undoubtedly part of a culturally important series, and possibly linked by an extension of "The Great Hopewell Road";

- through its connections with the Barnes family it holds special significance in the history of the State of Ohio, its early links to Virginia, and ***the early importance of its earthworks in the birth of American archaeology and national identity;***

- it may include as part of its design a heretofore unrecorded earthen circle, of a ***size unknown anywhere else in the world.***

The preservation of this site has at least two major benefits:

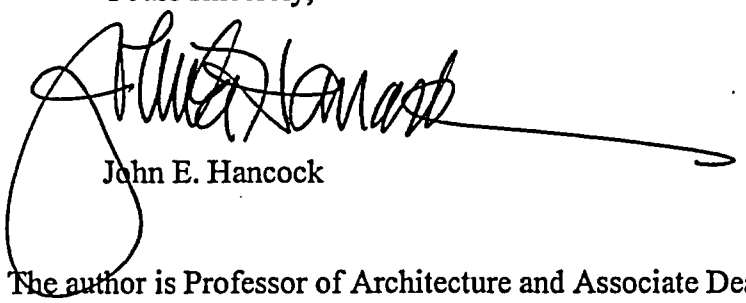
- it will enable the continuing study of a unique asset from this ancient Ohio Valley culture, now beginning to make its way back into the public consciousness in our region and beyond.

- it will strengthen the resource base for the increasingly-lucrative cultural heritage tourism industry and the potential for its associated ***high-quality, non-intrusive economic development in southern Ohio.***

The goal of our multimedia "EarthWorks Project" is to present these hidden or vanished sites to new audiences through new electronic media such as museum exhibits, computer discs, and a Website. Three times funded in this work by the National Endowment for the Humanities, we have confirmed the ***national cultural and historical significance of this ancient culture*** and their spectacular architectural monuments. Numerous inquiries from Europe attest to ***the international renown of this unique Ohio heritage***, and public awareness and interest here at home is also clearly increasing.

The opportunity to preserve a unique resource that sheds light on our predecessors in this valley should not be missed.

Yours sincerely,



John E. Hancock

The author is Professor of Architecture and Associate Dean for Research and Graduate Studies at the College of Design Architecture Art and Planning at the University of Cincinnati. He holds degrees in architecture and architectural history from Nebraska and McGill. His essays on architectural history and theory have been published widely in North America and at international symposia in Greece and Romania, including a Getty-funded series on the Greek Temple at the New Europe College, Bucharest, 2003. His grants, awards, and in-kind funding total over $1.6m including three NEH awards. His multimedia productions have been presented, published, and acclaimed in Beaune-Tailly (ArchaeoVirtua 1999), Barcelona (Virtual Reality in Archaeology 2000), Rio de Janeiro (Federal University 2000), New York (The Art Director's Club 2001); have won three times at the Columbus International Film and Video Festival; and have been featured in the past year in *The New York Times, Archaeology*, and *Wired.*

EXHIBIT I

Ohio Historic Preservation Office

567 East Hudson Street
Columbus, Ohio 43211-1030
614/ 298-2000 Fax: 614/ 298-2037

Visit us at www.ohiohistory.org

OHIO HISTORICAL SOCIETY
SINCE 1885

December 22, 2004

Geoffrey Sea
340 Haven Avenue, #3C
New York, NY 10033

Dear Mr. Sea:

RE: BARNES HOUSE, PIKETON, PIKE COUNTY, OHIO

Thank you for submitting a National Register of Historic Places questionnaire for the Barnes House, 1832 Wakefield Mound Road, Piketon,Ohio. From the information you sent us the property appears to qualify for nomination to the National Register of Historic Places. Based upon the information provided, the nomination should address Criterion A for the historical significance of the property associated with the Sargent's Passenger Pigeon and Criterion C for the property's architectural significance. At this time, I would encourage you to proceed in completing a National Register nomination.

Enclosed for your use is a National Register packet that includes a booklet of instructions and a sample nomination for similar historic properties. For copies of other sample nominations visit our web site at: http://www.ohiohistory.org/resource/histpres/toolbox/samplenoms.html

You may choose to research and write the nomination yourself or you may consider retaining the services of a historic preservation consultant to prepare the nomination package. Here is a link to historic preservation consultants qualified to do such work in Ohio, http://www.ohiohistory/resource/histpres/docs/HistArchMaster.pdf

If you have any questions, please feel free to call me at 614/298-2000 or email at bpowers@ohiohistory.org. We look forward to working with you as the nomination proceeds. Thank you for your interest in historic preservation and the National Register program.

Sincerely,

Barbara Powers

Barbara Powers, Department Head
Inventory and Registration

enclosures

#3137 Fee $1.00

CERTIFICATE FOR TRANSFER

F ROM

HENRY C.BARNES ? DECEASED

TO

Charles S.Barnes

CERTIFICATE FOR TRANSFER AND RECORD OF REAL ESTATE DEVISED

Probate Court, Pike County, Ohio

TO THE AUDITOR AND RECORDER OF SAID COUNTY.;

I the undersigned, Prpbate Judge of said County, do hereby certify, that on the 10th day of June , A.D. 1921 the last last will and Testament of Henry C.Barnes , late of said County , was duly admitted to Probate in this Court , and the same has been duly recorded in Volume 12 page 265 of the Records of Wills in this Office , That by the terms of said Will certain real estate was devised to Charles S.Barnes , That the following is a description of said real estate such as is contained in the Will, To-wit;

Item 7th , Subject to the lien created upon it for a family monument and markers, I give and devise to my brothor Charles S.Barnes , my farm, Situate in Scioto Township Pike County, Ohio and consisting of about 285 acres of land I also give and devise to my brother , Charles S.Barnes , my undivided half interest in the tract upon which our house stands , being 3-1/2 acres, more or less , xxxxxx these lands to be his absolutely and in Fee simple . THE FOLLOWING is a specific description of said Real Estate: The same being Situate in in Scioto Township, Pike County,Ohio and bounded and described as follows; to-wit; Being the North side of Sections 10 and 11, Township 4 range 22, beginning at a stone in the Range line the northeast corner of Section 10 , thence N. 87 deg. W. 435 poles to a stone in the line of Robert D.Welty ; thence with said line N. 42 deg. W. 38 poles to the Scioto River; thence up the river with the meanderings thereof to the line between Sections 8and 11 ; thence with said Section Line S. 87 deg. E. 181 poles to the place of beginning, containing 299 Two hundred and ninety nine acres, more or less. EXCEPTING therefrom the right of way of the Norfolk and Western Railway.

SECOND TRACT: Being the undivided one-half Interest in 3.50 acre tract upon which the house now stands , the same being Situate in Scioto Township, Pike County,Ohio and described as follows; to-wit Being in Range 22 Township 4 Sections 10 and 11---- N. pt. 1/2 Division Containing 3.50 acres, more or less

THE foregoing described tracts and described real estate is intended to Include all the property of which Henry C.Barnes , died seized.

AND IT APPEARING to the satisfaction of the Court , that the terms of said Will have been fully carried out on the part of the Devisee, hereinbefore named, it is ordered that such real estate be transferred upon the duplicated of said County to the name of Charles S.Barnes , the said Devisee, and that this certificate then be presented to the said County Recorder for record .

Witness my hand and the Seal of said Court this 18th day of May. 1927 .

Will H.Acord, Probate Judge. (SEAL)

Filed 5-23-1927 at 11 A.M.
Recorded 6- 10-1927

C. W. Cookson
Recorder

EXHIBIT J

Filed

EXHIBIT K

#820

3-10-53

1-7-48

DEED OF EASEMENT

Name and Address

Eas. No. 193 Map No. 1

Mr. Ernest J. Humphrey

Drg. No.

Waverly, Ohio

W. O. 300/140-101

In consideration of One dollars ($ 1.00) receipt of which is acknowledged, and in further consideration of the promises of the grantee, hereinafter set forth, Ernest J. Humphrey and Bertha T. Humphrey

his wife (~~or unmarried~~), herein sometimes called "grantor", hereby grants unto Ohio Valley Electric Corporation, the grantee, its successors, assigns, lessees and licensees, hereinafter collectively called "Company", a right of way and easement for an electric transmission line or lines in, on, over, through and across the following described lands situated in Jackson Township, County of Pike, State of Ohio, being part of ~~Survey No.~~, Section No. 11, Township ~~6-N~~ 6-N, and Range 22-W, and bounded and described as follows:

On the North by A. E. C.

On the East by Charles Smith

On the South by Nettie Welty

On the West by U.S. Hy. No. 23

and along the center line determined as hereinafter set forth, including the following rights:

To locate, construct, reconstruct, inspect, protect, maintain, repair, renew, operate and remove facilities for the transmission of electric energy and associate uses, consisting of towers, wires and cables, anchors, grounding systems, counterpoises and other incidental equipment and fixtures and to add to the number of wires, cables, anchors, grounding systems, counterpoises and other incidental equipment; to cut, trim and at Company's option remove any and all trees, overhanging branches or other obstructions within 75 feet of such center line and any and all other trees which in the opinion of Company's engineers may endanger the safety of or interfere with the construction, operation or maintenance of such facilities; to excavate and pile material and equipment on the surface of the above described lands during periods of construction and maintenance; and the right of ingress and egress over the above described lands and any adjoining lands of the grantor at any and all times for the purpose of exercising any rights herein granted.

To have and to hold the same unto the grantee, its successors and assigns, so long as this grant shall be used or occupied by it or them.

Said center line shall be as selected and laid out by Company or its agents and its location shall be finally evidenced by a line connecting the center points of the towers to be constructed on said lands, if any, and on adjoining premises.

COMPANY AGREES:

To pay to grantor at or prior to the time when construction of said facilities is commenced on the above described lands FIFTY dollars ($50.00) for each tower to be constructed thereon and TWO dollars ($2.00) per estimated linear rod of the center line thereon, such estimate to be agreed upon by grantor and Company at the time payment is made.

To pay grantor for injury to grantor's stock, and damages to crops and fences on the above described lands, done by Company or its employees while engaged in the exercise of any right herein granted.

Grantor, for grantor and grantor's heirs, successors and assigns, agrees that they will not cause, or permit any one other than Company to cause, any structure or spoil bank to be built, placed, piled or [illegible]

EXHIBIT L

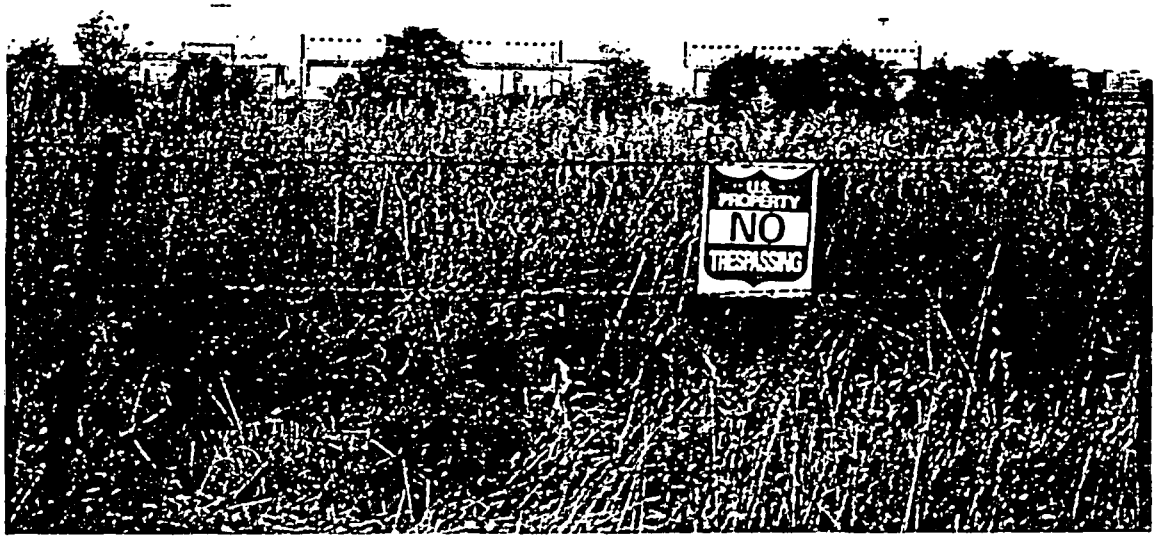


EXHIBIT M

Convention and Visitors Bureau

12455 St. Rt. 104 • P.O. Box 107
Waverly, Ohio 45690

Linda A. Basye
Executive Director

October 21, 2004

To Whom It May Concern;

This letter is in support of Mr. Geoffrey Sea's efforts to restore the Barnes Family Estate in Pike County Ohio, his efforts to acquire National Historic Register designation, and his intent to apply for National Landmark status.

This well-preserved mansion built by the then prominent Barnes family, will soon see the bicentennial of it beginnings. Built between 1804 and 1805 by John Barnes, Jr., this estate has been involved in many episodes and events, set in the political, environmental, and cultural history of the area.
One of the largest ceremonial mound works lies a few hundred yards away, with the great Indian Chief Tecumseh in his youth, camping here during annual migrations on his way to southern hunting grounds. John Barnes Jr., was an officer in the War of 1812 and participated in the state's political structure. Abraham Lincoln stayed at the house during his oratorical campaign through Ohio in 1859, while the property served as a way station on the Underground Railroad.

In 1900 the last wild passenger pigeon was shot in the immediate vicinity and stuffed and mounted by Mrs. Barnes and displayed in the home for several years (now in the custodial care of the Ohio Historical Society).

This is only a small accounting of the many early beginnings of the history of this estate and property, not even touching on the other historical events, or the more recent episodes involving this property.

Mr. Sea is seeking to obtain this property and restore this estate and the home place for use as an educational and historic museum.
The preservation of our historic homes and properties is extremely important to not only teach our children the importance of their history, but to bring awareness to all in the area of the heritage of their past.

In a time of economic stress, especially in southern Ohio and Pike County, to have an individual step up to complete the preservation and restoration, thereby acknowledging the importance of saving a part of our history, is greatly appreciated. Any way that we may serve to assist and support Mr. Sea in his efforts, besides the written letter, we will seek to do.

Sincerely Yours,

Linda A. Basye

Linda A. Basye

(740) 947-9650 • Fax: (740) 947-7716 • email: pike.travel@mail.scoca-k12.org • www.piketravel.com

EXHIBIT N

Absentee Shawnee Tribe of Oklahoma

2025 S. Gordon Cooper

Shawnee, Oklahoma 74801-9381

(405) 275-4030 Fax: 405-878-4533

Cultural/Historic
Preservation Department

February 24, 2005

RE: Support of Geoffrey Sea's intervention in the USEC American Centrifuge Plant Licensing Action

To the Commissioners, Secretary and Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission and to Whom it May Concern:

I am writing in support of the intervention of Geoffrey Sea in the USEC American Centrifuge Plant licensing action. I am the Tribal Historic Preservation Officer for the Absentee Shawnee Tribe. Our interest in supporting Mr. Sea's is based on the fact that Ohio is part of our ancestral homelands. Through historical research we have identified a number of village sites in the Ohio Valley. In fact, quite a few are located along the Scioto River. Furthermore, if you look at a map, you will notice that the names of towns, cities and counties reflect the Shawnee's historical presence within the state of Ohio.

We are part of the Algonquian family of Native American peoples, and the Algonquian tribes of the Ohio/Great Lakes region are collectively believed to be descended from the culture called Ft Ancient. In turn the Ft Ancient are considered descendants of the Hopewell culture. The people of the Hopewell Culture built the many astounding geometric earthworks, including those called the Barnes Works in Scioto Township.

All of the historic and prehistoric sites in the region of Scioto Township have great meaning and significance. The Barnes Works, being one of the largest and most beautiful prehistoric architectural works in North America, is a site that has already suffered desecration and destruction--but what remains can be saved.

Many more historic sites may exist in the area, remaining to be found for lack of extensive survey. Surveys to find such sites should be conducted as part of any 106 review for the ACP.

The American Centrifuge Project may impact all these sites in many ways that have not been studied or considered. Physical destruction caused by new buildings is only one concern. We also need to consider potential destruction of earthworks along the river caused by additional water pumping, the impacts of herbicides used to defoliate a security zone around the DOE site perimeter, the impacts of keeping the area under national-security restriction, rather than opening the area to study and tourism, and the aesthetic impacts of marring a sacred area with security fences, more roads, and shipments of radioactive fuel and waste.

Absentee Shawnee Tribe of Oklahoma

2025 S. Gordon Cooper

Shawnee, Oklahoma 74801-9381

(405) 275-4030 Fax: 405-878-4533

Cultural/Historic
Preservation Department

Our tribe has not been contacted by DOE about the American Centrifuge Project for consultation. We first learned about the American Centrifuge Project from Geoffrey Sea. Please note that we count on being included as a consulting party in future 106 and 110 reviews at the Piketon site.

We understand that the NRC has initiated a section 106 review as part of its licensing process. That is good. However this is an important test for preservation law. If a major federal nuclear project involving two different federal agencies can proceed without any consideration of one of the largest sacred sites in North America next door, then it means that the provisions of the National Historic Preservation Act have become meaningless.

Many alternatives to the proposed action deserve full study and consideration. USEC's environmental report mentions the possible alternatives of moving ACP to the north side of the Piketon site or moving it from Piketon to Paducah, Kentucky. Since the current site at the southwest corner of the DOE reservation involves many potential impacts, those alternatives among others need careful review.

Respectfully,

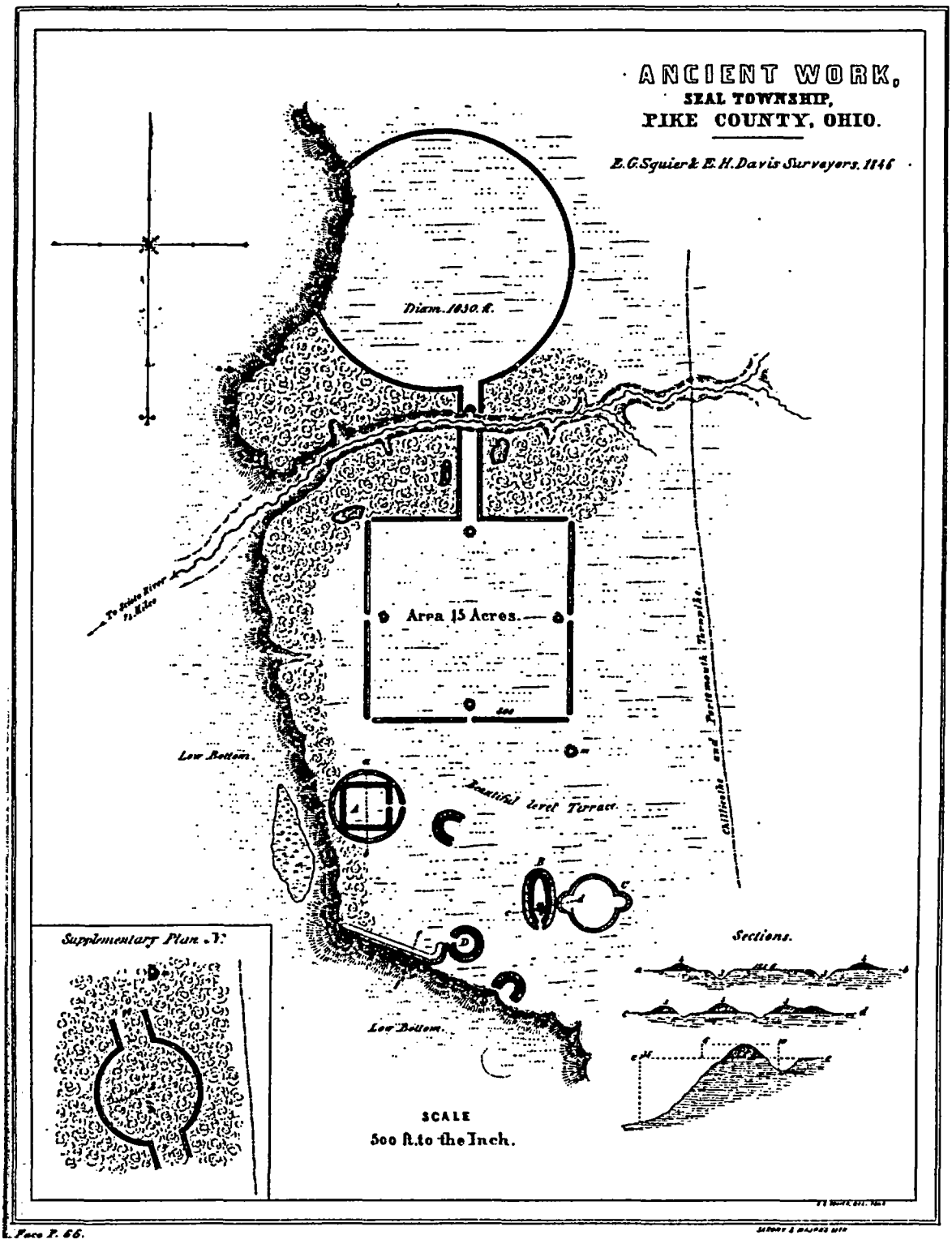
Karen Kaniatobe

Karen Kaniatobe
Tribal Historic Preservation Officer

EXHIBIT O

Exhibit O. Plate XXIV from Ephraim Squier and Edwin Davis, *Ancient Monuments of the Mississippi Valley*, 1848..

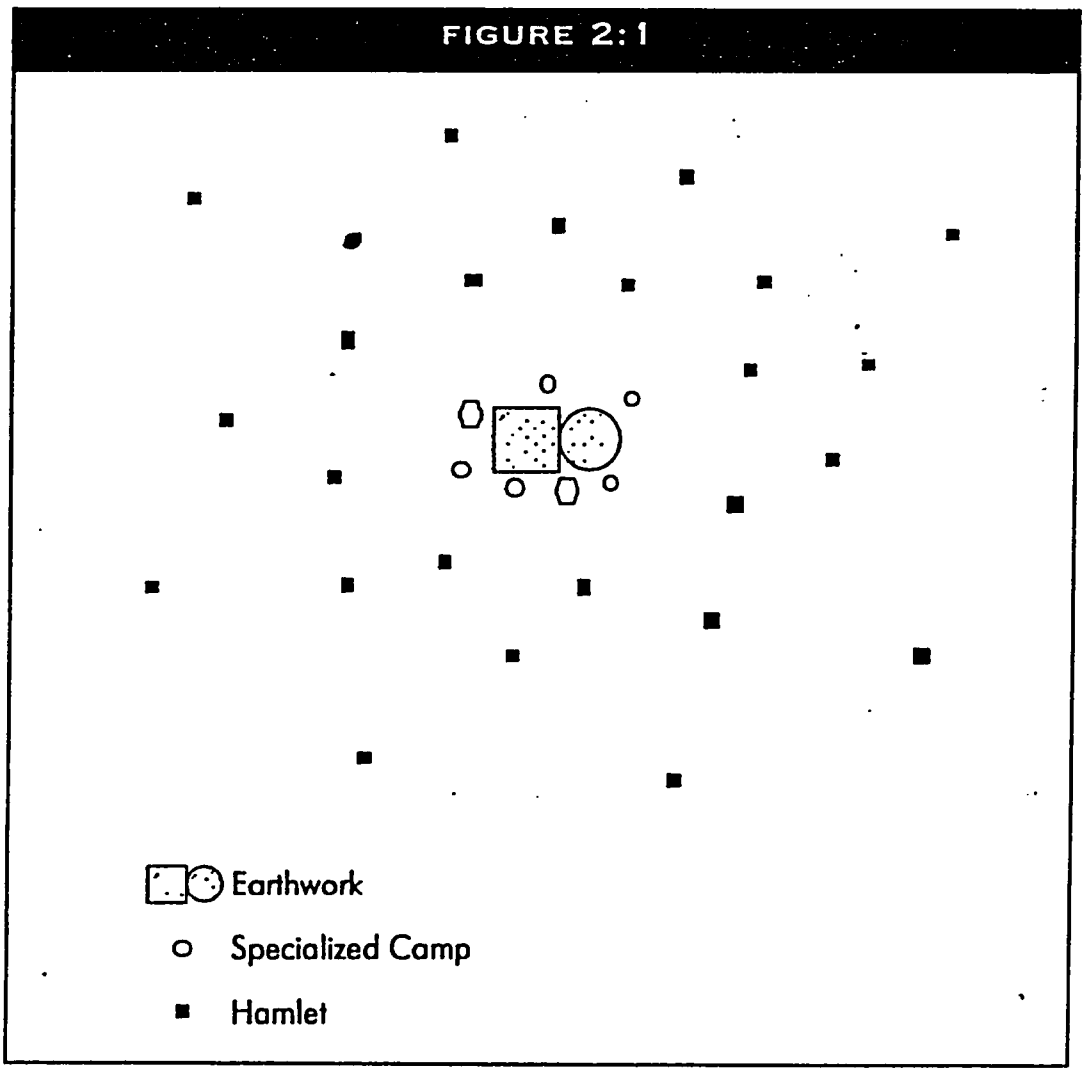
XXIV.



Page P. 66.

EXHIBIT P

Exhibit P. Generalized Model of an Ohio Hopewell Community, from Paul Pacheco, "Ohio Hopewell Regional Settlement Patterns," in *A View from the Core: A Synthesis of Ohio Hopewell Archaeology*, Ohio Archaeological Council, 1996, page 22.



Generalized model of an Ohio Hopewell Community.

EXHIBIT Q

Thomas F. King, PhD
P.O. Box 14515, Silver Spring MD 20911, USA
Telephone (240) 475-0595 Facsimile (240) 465-1179 E-mail tfking106@aol.com

Cultural Resource Impact Assessment and Negotiation, Writing, Training

February 24, 2005

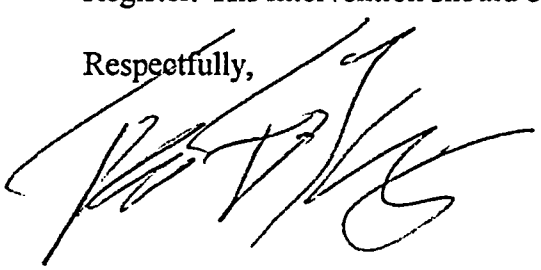
To: The Commissioners, Secretary and Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission, and Whom it May Concern.

I am writing in support of the intervention of Geoffrey Sea in the USEC American Centrifuge Plant licensing action. As a professional practitioner of archaeology and historic preservation in the United States, I am deeply concerned about the potential impacts of the proposed action on historic properties, and about the adequacy of NRC's and the Department of Energy's (DOE's) compliance with Sections 106 and 110 of the National Historic Preservation Act and other federal environmental and cultural resource legal requirements.

A copy of my professional resumè is attached. I hold a PhD in Anthropology from the University of California, Riverside, and have been practicing in historic preservation and environmental impact review for almost forty years, both within and outside the Federal government. I have some twenty years experience as a government official with the Advisory Council on Historic Preservation, the National Park Service, and the General Services Administration, and am currently self-employed as a consultant, writer, mediator, and trainer in historic preservation, tribal consultation, and environmental review. I am the author of four textbooks and numerous journal articles on these subjects, as well as a number of federal regulations and guidelines. My particular specialty lies in working with Section 106 of the National Historic Preservation Act, which requires Federal agencies to take into account the effects of their actions on places included in and eligible for the National Register of Historic Places.

It is because of my concern for the proper application of Section 106 and related authorities, and for the proper management of historic places, that I support Mr. Sea's intervention. Mr. Sea has, I believe, uncovered significant problems with NRC's and DOE's compliance with the historic preservation and environmental laws, and identified significant potential impacts on places eligible for inclusion in the National Register. His intervention should be given your very close attention.

Respectfully,



Thomas F. King, PhD

P.O. Box 14515, Silver Spring MD 20911 **Professional Resumè**
Telephone (240) 475-0595 Facsimile (240) 465-1179 E-mail tfking106@aol.com

Cultural Resource Impact Assessment and Negotiation, Writing, Training

Employment

Presently: Private consultant, educator, writer, facilitator in cultural resource management and environmental review; Trainer/Consultant, SWCA Environmental Consultants; Archeologist, The International Group for Historic Aircraft Recovery Amelia Earhart Project. Senior Instructional Consultant, National Preservation Institute. Member, Sussex Archaeological Executive, advising the Government of Great Britain regarding archaeological recovery of HMS *Sussex* off Gibraltar.

Formerly: Expert consultant to U.S. General Services Administration, program director for Advisory Council on Historic Preservation, Consultant to the High Commissioner, Trust Territory of the Pacific Islands, Archeologist with the National Park Service, consulting archeologist, head of archeological surveys at San Francisco State University, UCLA, University of California Riverside.

Education

PhD, University of California, Riverside, Anthropology, 1976.
BA, San Francisco State University (then College), Anthropology, 1968.
Certificate: Mediator, Bowie State University Center for Alternative Dispute Resolution, 1997.

Recent and current Clients

Government Agencies: Bureau of Land Management California State Office; Bakersfield Field Office; USDA Forest Service. USDA Farm Service Agency, U.S. Fish and Wildlife Service. U.S. Navy, U.S. Air Force, U.S. Army, Federal Aviation Administration. Grand Canyon Monitoring and Research Center. City of Newport News, Virginia.

Indian Tribes and Organizations: Klamath River Intertribal Fish and Water Commission; Mole Lake Sokaogon Community of Lake Superior Chippewa Indians; Bad River and Red Cliff Bands of Lake Superior Tribe of Chippewa Indians. Hualapai Tribe. Quechan Indian Nation. Round Valley Indian Tribes. Penobscot Tribe.

Private Sector: Blythe Energy Corp., Cingular Wireless. Odyssey Marine Exploration.

Non-profit organizations: National Preservation Institute.

Thomas F. King: Courses Taught

Short courses for SWCA Environmental Consultants, National Preservation Institute, University of Nevada, Reno, General Services Administration, Advisory Council on Historic Preservation, Environmental Protection Agency, National Park Service, and Department of Defense in cultural resource law and policy, Section 106 review, National Environmental Policy Act implementation, identification and protection of traditional cultural properties, Native American consultation, environmental justice, conflict resolution, and related subjects.

Thomas F. King: Publications (Selected)

Books and Monographs

- *Places that Count: Traditional Cultural Properties in Cultural Resource Management.* AltaMira Press 2003
- *Thinking About Cultural Resource Management: Essays From the Edge.* AltaMira Press 2002.
- *Amelia Earhart's Shoes.* With R. Jacobson, K. Burns, and K. Spading. AltaMira Press, 2001.
- *Federal Projects and Historic Places: the Section 106 Process.* AltaMira Press, 2000
- *Cultural Resource Laws and Practice: An Introductory Guide.* AltaMira Press 2004 (First edition 1998)
- *Piseken Nóómw Nóón Tonaachaw: Archeology in the Tonaachaw Historic District, Moen Island, Truk.* With P.L. Parker, Southern Illinois University, Carbondale and Micronesian Archeological Survey, Saipan 1984.
- *Anthropology in Historic Preservation.* With P.P. Hickman and G. Berg, Academic Press, New York 1977.
- *The Archeological Survey: Methods and Uses.* Interagency Archeological Services, Heritage Conservation and Recreation Service (National Park Service), Department of the Interior, Washington DC 1977 (Republished 2003 by California Division of Forestry).

Articles

- Considering the Cultural Importance of Natural Landscapes in NEPA Review: The *Mushgigagamongsebe* Example. *Environmental Practice* 5:4, Oxford University Press, 2003
- "I Learned Archaeology From Amelia Earhart: Using a Famous Mystery to Teach Scientific Methods." In *Strategies for Teaching Anthropology,* 3rd Edition, Patricia Rice and David McCurdy, eds., Prentice Hall, New York; 2003..
- "Cultural Resources in an Environmental Assessment Under NEPA." *Environmental Practice* 4(3):137-144, National Association of Environmental Professionals, September 2002.
- "Historic Preservation Laws" in *Encyclopedia of Life Support Systems.* EOLSS Publishers for UNESCO, 2002.

Articles (continued)

- "What Should Be the 'Cultural Resources' Element of an Environmental Impact Assessment?" *Environmental Impact Assessment Review* 20(2000):5-30, 2000.
- "Archaeology in the Search for Amelia Earhart." With Richard Gillespie. In *Lessons from the Past: An Introductory Reader in Archaeology,* Kenneth L. Felder, ed., Mayview Press, Mountain View CA, 1999
- "How the Archeologists Stole Culture: a Gap in American Environmental Impact Assessment and What to Do About It." *Environmental Impact Assessment Review,* January 1998.
- "The Nature and Scope of the Pothunting Problem." In *Protecting the Past: Readings in Archaeological Resource Management.* J.E. Ehrenhard and G.S. Smith, eds., The Telford Press, Caldwell NJ 1991.
- "AIRFA and Section 106: Pragmatic Relationships." In *Preservation on the Reservation,* A. Klesert and A. Downer, eds., Navajo Nation Publications in Anthropology 26, Window Rock 1991.
- "Prehistory and Beyond: The Place of Archeology" In *The American Mosaic: Preserving a Nation's Heritage.* R.E. Stipe and A.J. Lee, eds., US/ICOMOS, Washington DC, 1987.
- "Intercultural Mediation at Truk International Airport." With P.L. Parker. In *Anthropological Praxis: Translating Knowledge Into Action.* R.W. Wulff and S.J. Fiske, eds., Washington Association of Professional Anthropologists, Westview Press, Boulder 1987.
- "The Once and Future Drought." *American Archeology* 5:3:224-8, Ridgefield, CT 1985
- "Professional Responsibility in Public Archeology." *Annual Review of Anthropology* 12, Palo Alto 1983.
- "Recent and Current Archeological Research on Moen Island, Truk." With P.L. Parker. *Asian Perspectives* xxiv(1):11-26, Honolulu 1981.
- "The NART: A Plan to Direct Archeology Toward More Relevant Goals in Modern Life." *Early Man,* Evanston, winter 1981.
- "Don t That Beat the Band? Nonegalitarian Political Organization in Prehistoric Central California." In *Social Archeology,* C. Redman, Editor, Academic press, New York 1978.
- ""The Evolution of Complex Political Organization on San Francisco Bay". In *'Antap: California Indian Political and Economic Organization.* L.J. Bean and T.F. King, eds., Ballena Press, Ramona, CA 1974.

Government Guidelines and Regulations

- Regulations, guidelines, and plain-language brochures on environmental and cultural resource management, NEPA review, Section 106, and related topics, for Department of Agriculture Farm Service Agency (FSA) (unattributed, with FSA NEPA and Cultural Resource staff). FSA, 2004.

Government Guidelines and Regulations (Continued)

- Orders, Guidelines, and Fact Sheets: Cultural Resource Management, Floodplain Impact Management, Wetlands Impact Management, Federal Real Property Disposal, Archeological Collections Management, Indian Sacred Sites Management, Historic Document and Artifact Management, Environmental Justice, and Social Impact Assessment (unattributed, with GSA NEPA Call-In Staff). General Services Administration, Washington DC, 1998.
- *NEPA Desk Guide* and related orders (unattributed, with L.E. Wildesen and GSA Environmental Quality Working Group). General Services Administration, Public Buildings Service, Washington DC, 1997.
- *Guidelines for Evaluating and Documenting Traditional Cultural Properties.* With P.L. Parker. National Register Bulletin 38, National Register of Historic Places; National Park Service, Washington DC, 1990
- *Preparing Agreement Documents.* Advisory Council on Historic Preservation, Washington DC, 1989.
- *Public Participation in Section 106 Review: a Guide for Agency Officials.* Advisory Council on Historic Preservation, Washington DC 1989.
- *Identification of Historic Properties: a Decisionmaking Guide for Managers.* Advisory Council on Historic Preservation and National Park Service, Washington DC 1988.
- *The Section 110 Guidelines: Guidelines for Federal Agency Responsibilities Under Section 110 of the National Historic Preservation Act.* With S.M. Sheffield. 53 FR 4727-46, National Park Service, Washington DC 1988
- *Regulations for the Consideration and Use of Historic and Cultural Properties* (Unattributed). Commonwealth of the Northern Mariana Islands Historic Preservation Office, 1983
- *Treatment of Archeological Properties: a Handbook.* Advisory Council on Historic Preservation, 1980.

Popular

- "Amelia Earhart: Archaeology Joins the Search." *Discovering Archaeology* 1:1:40-47, El Paso; January-February 1999
- "Sea Changes: 14th Century Micronesia." *Glimpses of Micronesia and the Western Pacific* 25:1, Honolulu 1985.
- "Tonaachaw: a Truk Village Rediscovers its Past." With P. Parker. *Glimpses of Micronesia and the Western Pacific* 21:4, Honolulu 1982.
- "How You Can Help the Archeologists." *Boys Life,* Boy Scouts of America, 1971.

Other

- Videotapes on "historic contexts" and "traditional cultural properties," for National Park Service
- "E-Book" environmental review software, for General Services Administration
- "NEPA for Historic Preservationists and Cultural Resource Managers," worldwide web pages for National Preservation Institute.

EXHIBIT 5